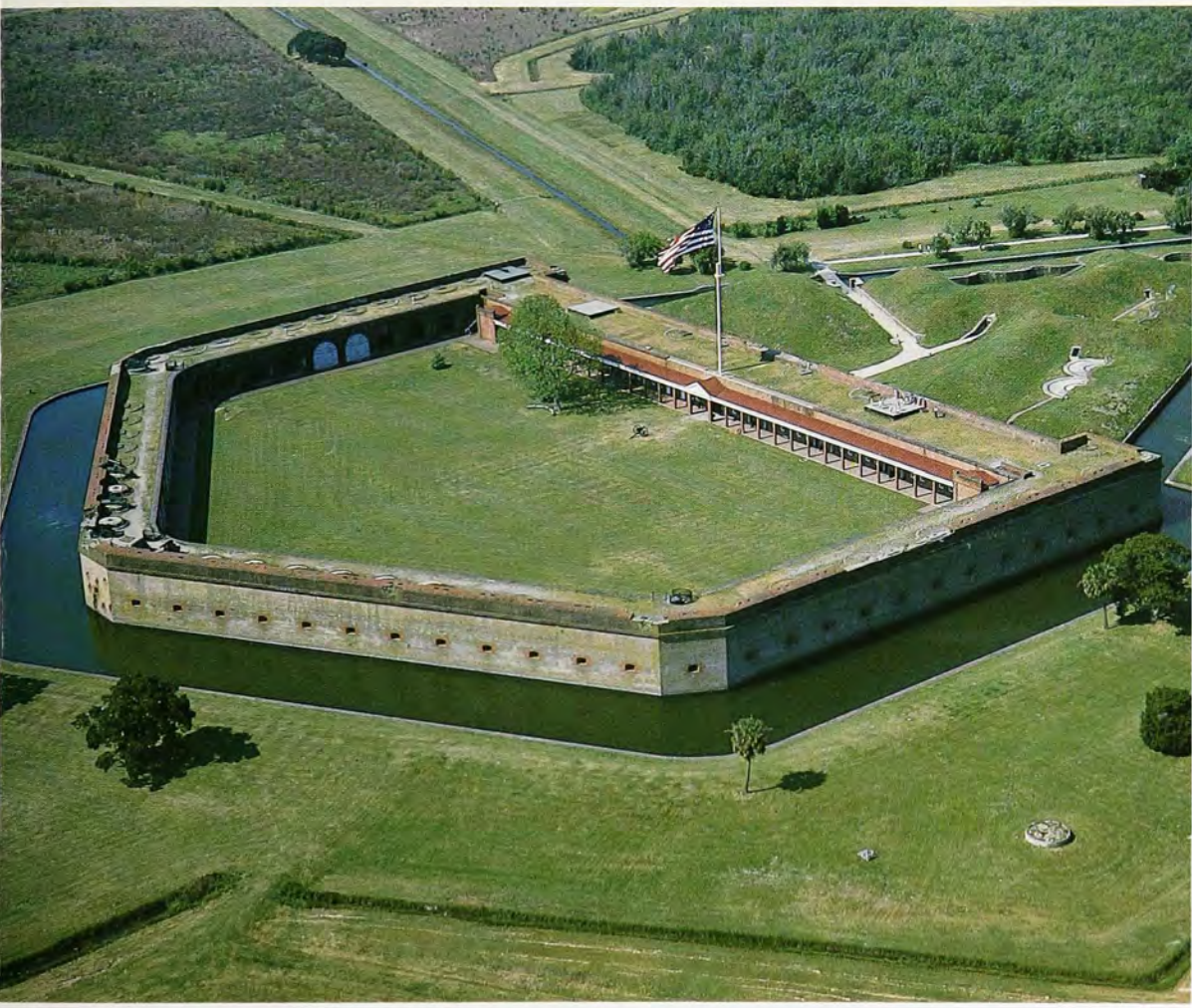
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# History of Savannah District

US Army Corps of Engineers
Savannah District



FORT PULASKI: The first headquarters for the Savannah area Corps of Engineers operations.

# 1829 – 1989

# Report Documentation Page

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# A History of the Savannah District U.S. Army Corps of Engineers

*by*

*Henry E. Barber*

*and*

*Allen R. Gann*

Savannah District
United States Army Corps of Engineers
Savannah, Georgia
1989

## FOREWORD

The U.S. Army Corps of Engineers, born in 1775 during America's struggle for freedom, has been instrumental in the evolution of a strong and independent nation. Last year, Savannah District — one of the larger of 38 Corps districts worldwide — observed its 160th year of service to our country. As this history relates, the district's roots in the Savannah area can be traced to 1829 when Army Engineers, assigned to the Corps' "Savannah Station," were involved in the construction of Fort Pulaski and the conduct of surveys in the Savannah River. Officially designated the "Savannah District" of the Corps in 1888, the District — with increasing workload and civilian manpower — has continued this dual mission of military construction and civil works development begun by those early Army Engineers.

The Savannah District of the Army Corps of Engineers played a major role through the years in the development of water resources in the Savannah River Basin and Coastal Georgia. Among its larger projects have been harbor-improvement work and the planning, design, and construction of the Hartwell, Richard B. Russell, and J. Strom Thurmond Dam and Lake projects on the upper Savannah River.

Of primary importance, the history recalls Savannah District's military support effort which, although noted in the early fortification work of Savannah's Army Engineers, began in 1940. As a design and construction agency, the district has designed and built military facilities, ranges and airfields, and provided other types of support, for some of the most important military installations in the Southeast — including Forts Bragg, Benning, Jackson, and Gordon, and Robins, Pope, and Seymour Johnson Air Force Bases. During World War II, the district was heavily involved with the construction of airfields and the development of installations such as Forts Stewart, Gordon and other posts. Later, the Savannah District filled a vital role in supervising fast-track construction activity during the period of the Korean Conflict and during the Vietnam War effort. Since the Southeast was the nation's military training ground, Savannah District had one of the largest — if not the largest — assignments of military work in the continental United States.

I hope this book, which traces Savannah District's origins, missions, and accomplishments will serve as a historical source for those interested in Corps of Engineers activities in the Southeast. As Savannah District begins the decade of the 1990s, we look forward to continuing our service to the Army, Air Force, and the country.



RALPH V. LOCURCIO
Colonel, U.S. Army
District Engineer

## THE AUTHORS

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## AUTHOR'S PREFACE

We have divided the history of the Savannah District into three time periods that included national developments affecting the activities of the Corps of Engineers.

The first period, extending through the Civil War, was characterized by much experimentation in meeting the needs of a young nation torn between the conflicting values of national strength and regional loyalties. The second period, from the close of the Civil War to 1940, saw tremendous change as the nation became increasingly industrialized and urbanized. The Corps of Engineers, both on a national level and in Georgia, was called on to meet the many challenges associated with these changes. Consequently, the Corps became more and more involved with river and harbor improvements and with the military projects that were required to keep pace with the challenges of modern warfare. The final period, from 1940 to 1984, was a complex and demanding time for both the nation and the Corps. World War II and the Cold War increased the need for a strong peacetime military establishment. At the same time, the civil mission of the Corps changed to meet the needs of a post-industrialized society for energy, recreation, and careful regulation of the use of the environment. Because of the Corps' involvement with these public trends on the one hand and with the U.S. Congress on the other, it often has been a target of criticism from both elected officials and concerned citizens. Through the decades, the Corps has learned to play the role of "middle-man" in a changing society.

Through all of these periods, the dedicated and skilled people of the Corps of Engineers have made the agency what it is today — and always has been — a national instrument of planned growth concerned with following proper procedures, good economics, and sound engineering. The Savannah District is no exception.

Anyone familiar with geographical names in the study of history soon learns that the spelling often changes through the years. Such is the case with Georgia history. In an effort to maintain the flavor of the times, we have used the spellings contemporary to those periods being discussed. Thus the reader should not be surprised to read in early chapters, for example, about the St. Mary's River, which in later chapters becomes the St. Marys River.

This project could not have been completed without the aid and encouragement of numerous people. We are grateful to the men and women of the Savannah District who gave so graciously of their time and knowledge. We would be remiss in not recognizing those upon whom we intruded regularly: Joyce Edenfield, Faye Jordan, Francis Boykin and Judy Patterson of the Office of Records Management, who demonstrated great patience in obtaining records and processing manuscripts; Jim Dorsey, who supported and assisted our raids on the District Technical Library that he so ably headed; Ronald Brunson, Chief, Engineering Division (Retired) and four retired members of the District — Kelly Mims, Ben H. Cunningham, Clarence C. Brown, and Harry Sugden — who read the manuscript and made valuable additions of both facts and interpretations. Special recognition is also due the late Mary L. Granger, a long-time member of the Savannah District staff whose history of the District, published

in 1968, was a rich source of information and historical perspective.

Several people at Brunswick College played important roles in this undertaking. Calvin DeWeese, Director of Media Services, generously contributed his professional expertise and the equipment that made possible many of the photographs and illustrations throughout this work. Virginia Boyd, Associate Librarian of the Gould Memorial Library, greatly reduced the strains of limited time and travel funds by locating and securing research materials from distant libraries. Jo Mason, secretary in the Special Programs Division, went beyond the call of duty in helping to meet deadlines for manuscript completion, and Gwen Barber endured many long night hours typing and revising the manuscript.

At the Federal Archives and Records Center Regional Office in East Point, Georgia, Mary Ann Hawkins and Jay Terrell provided desperately needed assistance in finding many District records that were assumed to be lost. This gave our research a measure of depth that it would not have had otherwise. We acknowledge the helpfulness, the graciousness, and the unending patience of the entire staff of that center.

We thank William B. Jolley for first attracting our attention to this project. Beyond that, however, he has been long suffering in dealing with our shortcomings and in encouraging our pursuits.

Finally, no other persons deserve our gratitude more and none are more special than our families, who with love and patience have endured all the trials and frustrations that inevitably accompany a project such as this.

Henry E. Barber
Allen R. Gann
Brunswick, Georgia
June 1, 1985

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# 1 SETTING THE SCENE

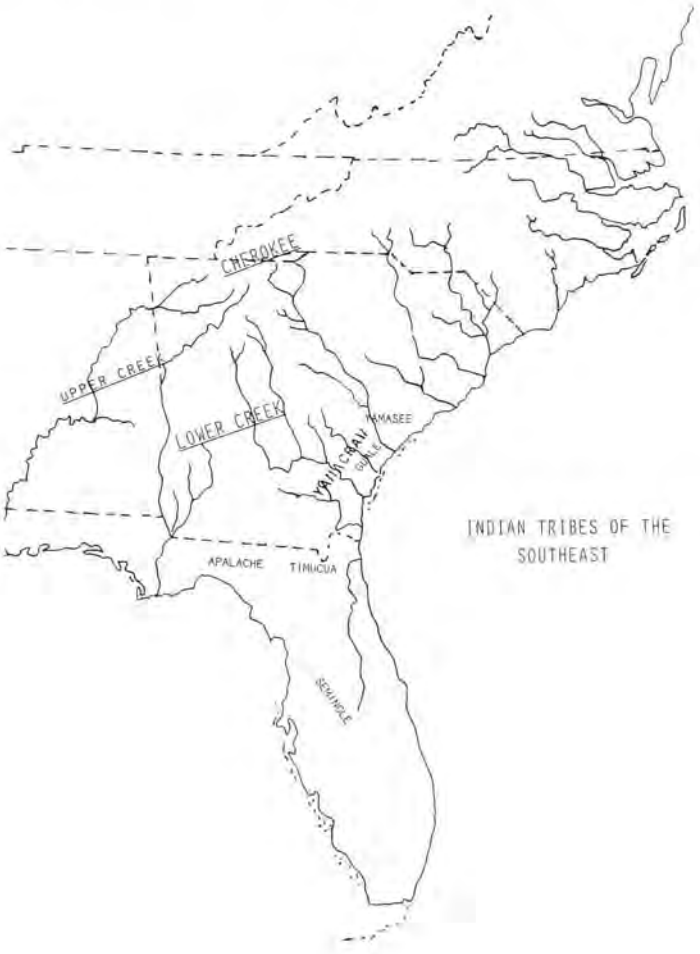
English settlers founded the city of Savannah in 1733. It was the first settlement in the territory that was to become the colony and then the state of Georgia. The city is on the banks of the Savannah River, a waterway important to the commerce and transportation of Georgia and to the activities and operations of the Corps of Engineers in the Savannah District.

Before settlement by the English, the entire coastal area from Virginia through Florida had been claimed first by Indians and then by Spain, whose conquistadors entered the region as early as 1540. The area also holds many clues to the existence of prehistoric peoples. A huge effigy of an eagle "made of stones of many sizes and shapes, rising twice as high as a tall man's head above the level of the ground" is located near Madison, Georgia.[1] Great earth mounds are scattered through the state from the Nacoochee Valley in the north to the lower reaches of the Altamaha River in the south. The mounds in the old Ocmulgee Fields near Macon, those at Cartersville, and those in Early County near Kolomoki are among the most important archaeological sites in the nation.[2]



*Great and Lesser Temple Mounds, Ocmulgee National Monument near Macon, Georgia, n.d. (Photo by B. Berg, courtesy National Park Service)*

Two great Indian tribes lived in Georgia when the white men first came. The Cherokees dwelt in the northern, mountainous region and were more numerous and more civilized. The Creek, or Muskogee, Indians lived in what is now central Alabama and Georgia.[3] Though they were composed of various tribes, they were held together by ties of language, intermarriage of clans, and frequent meetings of village headmen. In historic times the Creeks numbered from 7,000 to 9,000 and could muster from 2,500 to 3,500 fighting men.

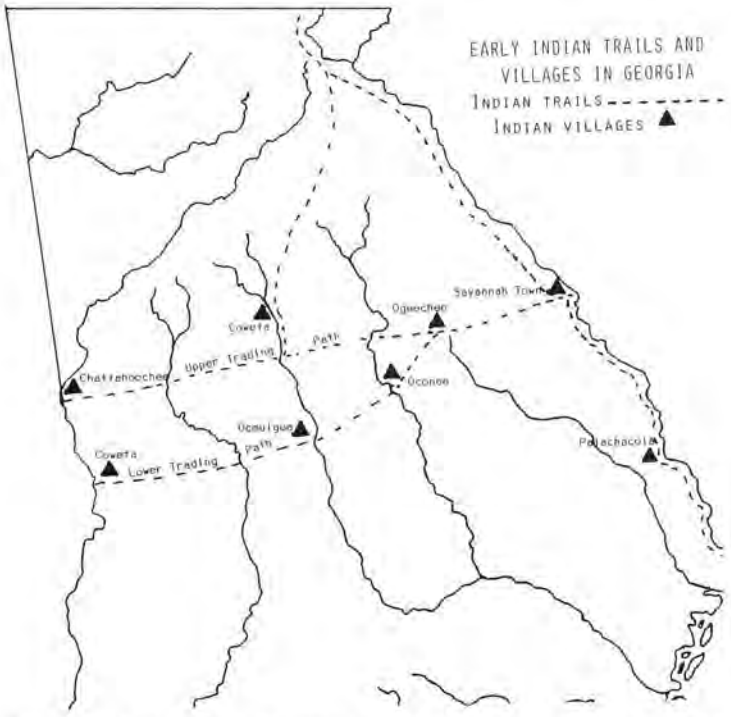



*Map showing the general locations of Eastern Woodland Indian tribes in southeastern North America. The Guale, the Yamacraw, and the Timucuan were the Indian groups with which the early Georgians had greatest contact. (Map drawn by authors)*

Europeans, ignoring the Creek ethnic distinctions, divided the confederacy into two geographical groups, which they called the Lower Creeks and the Upper Creeks. The Lower Creeks comprised all the towns and settlements along

the Flint, the Chattahoochee, and the Ocmulgee rivers.[4] Early reporters described the Creek towns as being "very commodiously and pleasantly situated on large beautiful creeks or rivers where the lands are fertile, the water clean and well tasted, and the air extremely pure."[5] The Creeks dwelt in towns, with only outcasts and exiles living alone.[6] The towns invariably were located along streams or, if inland, close to springs.

Primarily, however, the Creeks were sustained by the forests. They traveled through woodlands in war parties and hunting groups, and especially as traders. In doing so, they made innumerable paths leading from town to town, from tribe to tribe, and from homes to hunting grounds. These paths were literally



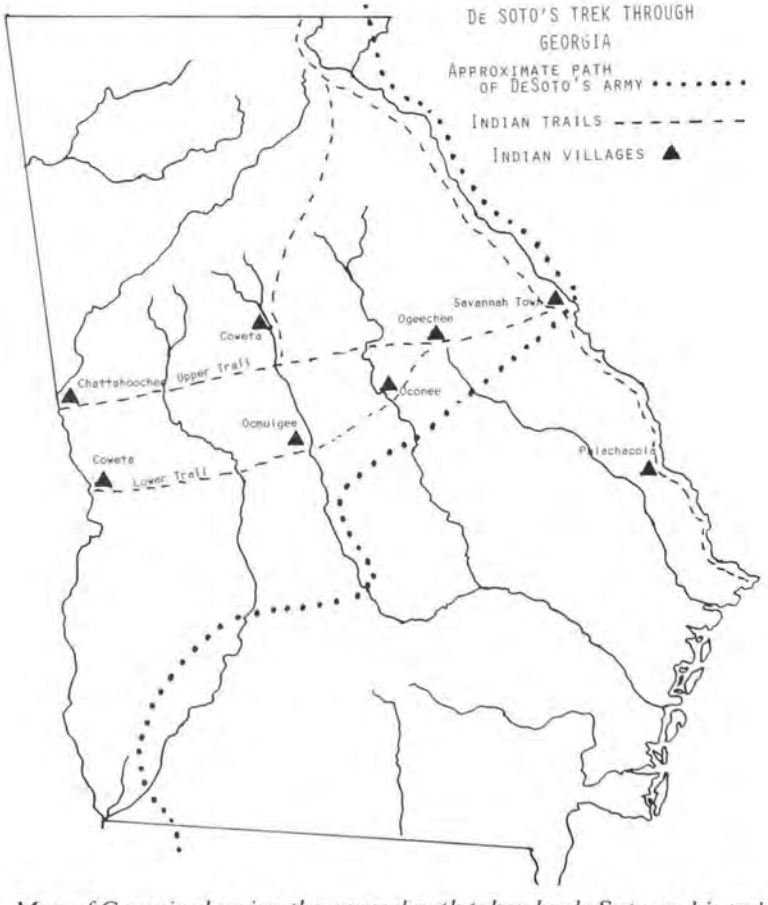

*Map of early Georgia showing major Indian villages and trading paths. (Map drawn by authors)*

"highways" bypassing the low swamps and impassable streams.[7] The considerable amount of trade conducted over these roads resulted in a professional class of Indian trader.[8] Salt, pipes, farm products, shells from the coast, flint, and a variety of other items were traded. The traders were neutrals whose activities were allowed to continue practically unhampered even in the midst of war. The Indian's familiarity with the benefits of trade made him readily accept the white trader and thus brought the developments that ultimately altered the destiny of the Indian himself.

The Spanish, however, came not as traders but as conquerors. When Hernando de Soto, obsessed with the search for gold, crossed Creek territory in 1539 and 1540, he was said to be "much given to the sport of killing Indians."[9] As one historian wrote, "From every drop of Indian blood thus spilt, there sprang up armed warriors."[10]



*Hernando de Soto, n.d.*
*(Special Collections Division University of Georgia Libraries)*




*Map of Georgia showing the general path taken by de Soto on his trek through the region. (Map drawn by authors)*

The Spanish who came after de Soto also worked to conquer the Indians with the cross and the sword but failed to establish any permanent European settlements in the region. Instead, they exerted their influence through "mission-forts" planted on St. Catherines, Cumberland, St. Simons, Sapelo, and other islands along the coast. But they did not confine their activity to the coast. Before 1700, they had moved far inland, to northwest Florida and southwest Georgia. Their crude forts and churches, known as presidios, were operated




*Map of the coastal region of early Georgia showing the locations of Indian villages and Spanish Presidio-Missions in the 16th century, n.d. (Special Collections Division University of Georgia Libraries)*

from Spanish headquarters at Havana and St. Augustine. The Spanish government sought to maintain a viable claim to the territory through the presence of these presidios. Meanwhile, Indians continued to roam the land and, as food-gatherers and subsistence farmers, to use the natural resources. With the exception of a major Indian uprising in 1597, Spanish missionaries and soldiers maintained a generally tolerable relationship with these Indians until the late 17th century.

The coming of the English to Jamestown in 1607 set the stage for a new-world conflict between Spain and England that would last for more than 150 years. The Spanish resented the presence of the Virginia colony on lands they claimed, but because Jamestown was far to the north of St. Augustine, they did nothing to try to expel the British.

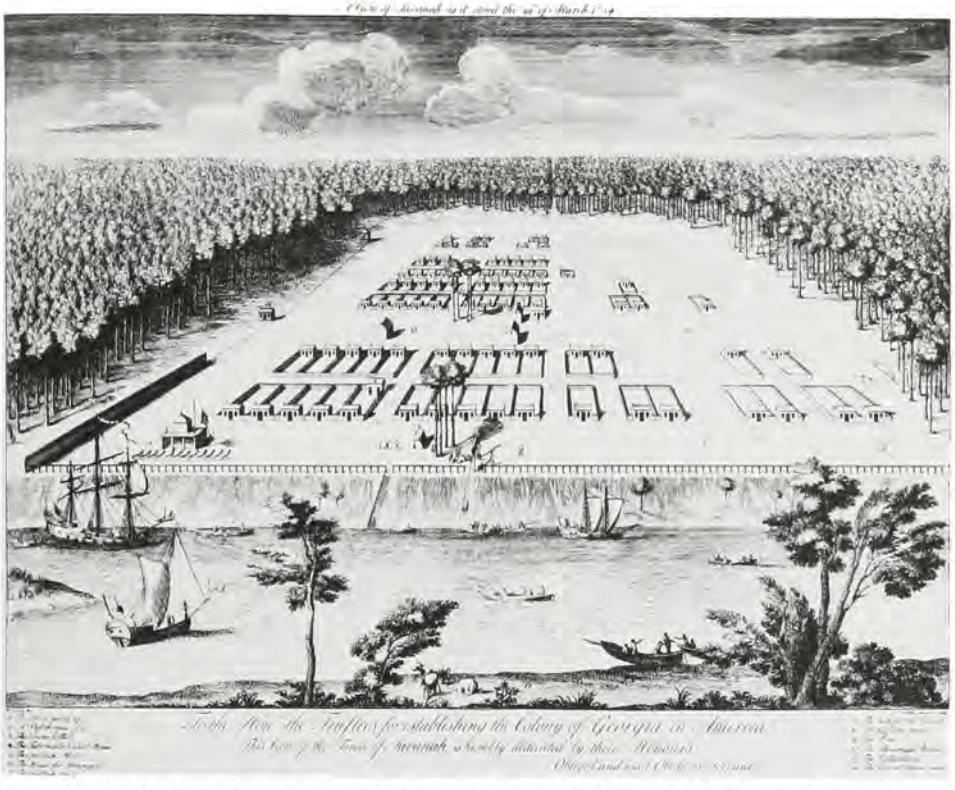
In 1663, when Charles II of England granted a vast land area called Carolina to eight loyal supporters, the English began encroaching farther south from Virginia. England and Spain decided by treaty in 1670 that actual possession of land would determine ownership. In that same year the British settlement of Charles Town, later Charleston, in South Carolina provided England with a claim that posed a real and present danger for the Spanish. The coastal area between Charles Town and St. Augustine immediately became a "debatable land."[11] Spain's troubles were intensified by the fact that the Indians of the region began to encounter the mercantile Englishmen, who were adept at luring the natives away from their already fragile relationship with the Spanish.

Thereafter, small bands of Creeks appeared regularly at Charles Town to trade. English influence soon became so great with the Lower Creeks that a few Creek bands joined with other Indians in raids on the Spanish coastal missions, forcing their abandonment by 1685. The destruction of the missions caused many of the Indians who had been converted to Catholicism either to flee to St. Augustine for protection or to recant and join the Creeks.[12] With Spain's withdrawal to the area around St. Augustine, the "debatable land" reverted to Indian occupancy until the 1730s. English traders moved relatively freely across the Indian trails and waterways to exploit their commercial relationships with the natives. This activity determined the nature of Indian-English relations during the succeeding decades.



*James Edward Oglethorpe, n.d.*
*(Special Collections Division University of Georgia Libraries)*

The settling of Savannah in the newly founded British territory of Georgia sealed the fate of the "debatable land." James Edward Oglethorpe, one of a group of English philanthropists who composed the Trustees for Establishing the Colony of Georgia in America, landed on the south bank of the Savannah River with approximately 120 settlers in February 1733. On 10 February Oglethorpe described the site in a letter to the trustees of the Georgia colony:



*Drawing of the settling of Savannah done by Peter Gordon in 1734. Notice the high bluff upon which the town is laid out and the hoist being used to lift cargo to the top of the bluff. (Special Collections Division University of Georgia Libraries)*

> "I fixed upon a healthy situation about ten miles from the sea. The river here forms a halfmoon, along the South side of which the Banks are about 40 feet high; and upon the top a Flat, which they call a Bluff.... Ships that draw 12 foot of water can ride within ten yards of the Bank."[13]

From the very beginning, then, the natural harbor provided by the Savannah River was significant in the development of the region.

The success of the Savannah settlement was due in large measure to agreements made between Oglethorpe and the chief of the local Indian tribe.[14] This tribe, a branch of the Yamacraw Creeks, and its chief Tomochichi agreed to reciprocal provisions whereby the English would send traders to the Indian towns in the interior in return for possession of coastal lands. The Creeks also agreed to resist any settlement by countries other than England. In a second negotiation two years later, boundary agreements defined the Georgia limits as




*Map of the County of Savannah*



*Chief Tomochichi (Tomo Chachi) of the Yamacraw Creeks with his nephew, Toonahowi. The painting was done when the two visited England in the 1730s. (Special Collections Division University of Georgia Libraries)*

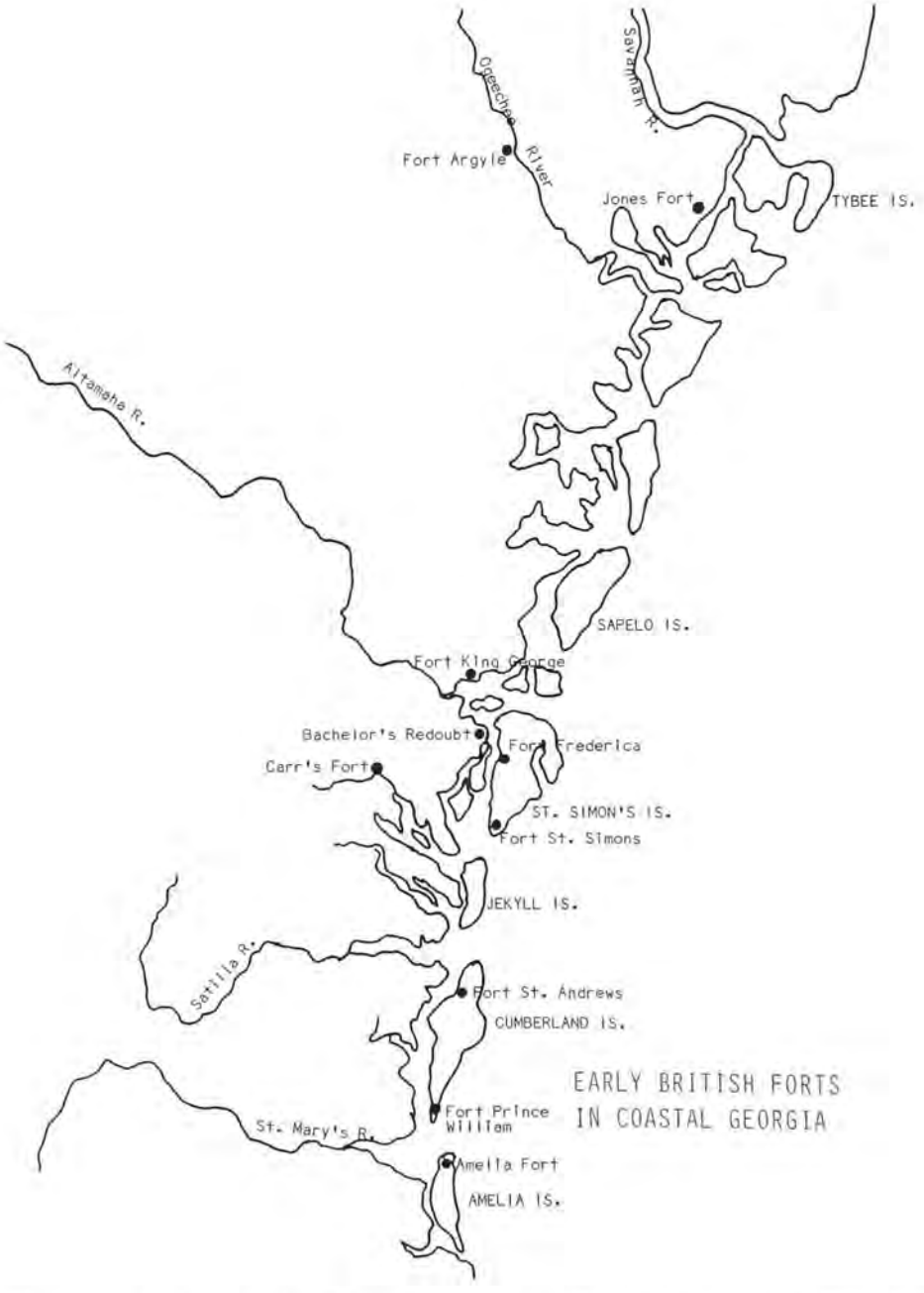
including all that territory south and west of the Savannah River up to two hours' walk above the tidal flow and as far south as the St. John's River. The English were granted land at the falls of the Savannah River as a site for a fort.




*Map showing the 18th-century English settlements along the coast from Charleston, S.C. to St. Augustine, Fla. Notice the inaccurate route drawn for the "Alatamaha" (Altamaha) River. Since the charter of Georgia gave the colony possession of the land area southward to the mouth of the Altamaha, this inaccurate conception supported Oglethorpe's settlements all the way to the mouth of the St. John's River in Florida. (Special Collections Division University of Georgia Libraries)*

This later became the trading town of Augusta.[15] The Indians retained possession of the coastal islands of Ossabaw, St. Catherines, and Sapelo, which they used for seaside hunting and fishing.

Later problems for the Georgia colonists came not from the Indians but from the Spanish. As Oglethorpe continued to extend the Georgia settlements southward to Frederica on St. Simons Island, and as he established fortified outposts on the barrier islands as far south as Amelia Island and the mouth of the




*Approximate locations of the British forts in Georgia from the Savannah River to the St. Mary's River. (Map drawn by authors)*

St. John's River, the Spanish became more and more agitated. When diplomatic negotiations failed to resolve the question of territorial boundaries, and when confrontation between England and Spain continued to build in the Caribbean, war became imminent. This Anglo-Spanish war was declared officially in 1739 and lasted until 1748.[16] In North America it involved an unsuccessful attempt by Oglethorpe to invade Spanish Florida and to occupy St. Augustine in 1740, an abortive retaliatory expedition aginst Georgia and South Carolina by the Spanish in 1742, and a second unsuccessful British excursion into Florida in 1743. Military activity along the southeast coast stalemated during the last five years of the war, but by war's end, the British had established dominance. The Spanish claim to territory north of the St. Mary's River was no longer viable, although the treaty of 1748 did not provide a final solution to the question of territorial boundaries. The land between the Altamaha and the St. Mary's rivers was considered "neutral ground."[17]

After 1748 Georgia was an undisputed British possession and moved into the mainstream of the developments that ultimately led to the colonists' revolt against England and to the creation of the United States of America. This "Anglicizing" of the colony of Georgia was made final at the end of the French and Indian War (1754-1763) when the Spanish, as allies of the French, finally were expelled from the Florida territory.

Trade flourished during the colonial period of Georgia's history. Augusta, at the head of navigation on the Savannah River and located on several of the most important Indian trails, prospered after its founding in 1736. It served as the entrepôt for the Indian trade and as a growing market town for the back-country settlers. Here the rugged and individualistic traders loaded their horses with goods and set out for the Indian country, returning with deerskins and pelts that were sent downstream for overseas distribution. It was a brawling, bustling frontier community.[18] Augusta traders, however, usually represented Charleston merchants, so its prosperity had little effect on the rest of Georgia.

As the Georgia economy improved, the colonists began to seek overseas markets for their products. Savannah, which in 1754 had been a town of fewer than 200 simple frame houses, began to reflect the prosperity. Although only 52 ships cleared Savannah in 1755, more than three times that many put to sea in 1772. Numerous other small craft plied the inland passages and the navigable streams of the province. The crops and goods these vessels carried from Georgia reflected the variety and abundance of its agriculture, Indian trade, and primary industries.[19] The firm of Harris and Habersham, established in 1744, had constructed the first wharf in Savannah for seagoing vessels. This was soon followed by others. By 1769, 32 merchants were advertising in the Savannah *Gazette* and by the mid-1760s more than a dozen merchants' warehouses were located along the waterfront in what was referred to as "commerce row."[20]

Savannah soon came to be dominated by coastal rice planters and their needs. Georgia rice found its way to the Mediterranean, and wines were brought back from Portugal and Madeira. Although most manufactured goods entered the colony from England, intercolonial trade flourished. By the time of the American Revolution, the economy of Georgia revolved around two centers: Augusta in the back country and oriented toward the interior, and Savannah on the coast and oriented toward the sea. The Savannah River was the artery

connecting the two.

While Georgia was part of the British empire in North America, it was an integral part of the national and international planning that was conceived and pursued by the British Parliament. The American Revolution, however, was a revolt against that very process of centralized planning. Consequently, the nature and function of a national government in the United States and the relationship of such a government to the newly formed independent states were questions that would plague the young country between 1790 and 1865. As a result of its sense of independence, much of the commercial and internal physical development that took place in the country prior to 1812 was achieved at the state level and through the initiative or support of state governments.

## THE NATIONAL ENVIRONMENT FOR PLANNING

The suspicions regarding the power of a strong national government and the feelings of independence that accompanied the American Revolution did not entirely suppress the nation's interest in national planning. The document representing the most comprehensive blueprint for national planning was probably the report on roads and canals that was presented to the U.S. Senate on 4 April 1808 by Albert Gallatin, Secretary of the Treasury in Thomas Jefferson's administration.



*Albert Gallatin, Secretary of the Treasury under Thomas Jefferson, n.d. (Special Collections Division University of Georgia Libraries)*

Gallatin justified the Federal Government's involvement in constructing roads and canals on the basis of the geography of the country and national self-interest. In 1808, of course, the United States extended only from the Atlantic Ocean on the east to the Mississippi River on the west, with the exception of the broad stretch of the trans-Mississippi Louisiana Territory, which was unsettled. The main goals for national development were to improve communications between the northern and southern states and between the settlers beyond the mountains and the East. With respect to the first of these, Gallatin pointed out that the United States possessed an inland navigation channel "which, from Massachusetts to the southern extremity of Georgia, is principally, if not solely, interrupted by four necks of land." These four locations were Cape Cod, a portion of New Jersey, the peninsula between the Delaware River and Chesapeake Bay, and the "marshy track which divides the Chesapeake from Albemarle Sound." Gallatin asserted that these areas should be cut by canals that would total less than 100 miles and would be useful "in peace or war" as protection against "storms and enemies." In making these recommendations and justifying them on the basis of national security, Gallatin presaged the development of the Intracoastal Waterway system and the involvement of the Corps of Engineers in that project.

Communication with the West presented a greater problem because the way was blocked by the Appalachian Mountains. Although crossing them via canals would be impossible, there were sites where the upper reaches of the western and the eastern rivers were near enough to be connected. One of four such places that Gallatin noted was between the Tennessee and the Savannah rivers. The report recommended improvements in navigation on the Savannah River and a road connecting it with the Tennessee. Finally, Gallatin referred to the great problem of local and sectional conflicts: "The National Legislature alone, embracing every local interest, and superior to every local consideration, is competent to the selection of such national objects."[21]

When Gallatin's report was presented in 1808, the need for improved national trade suggested that it would be acted upon favorably. More than a million people in the western states and territories, and many others in western New York and Pennsylvania and in what is now West Virginia, lacked access to the eastern markets. If these areas could be opened by providing cheap transportation, both East and West would profit. The difficulty in the past had been in attracting the necessary funds. Private investment had failed to open up the needed lines of communication and transportation. The answer appeared to be either assistance from or construction by the government.

In addition to providing economic incentives for national action, a political precedent was set in George Washington's Farewell Address. The President stated the importance to national unity of "the progressive improvement of interior communication by land and water."[22] Jefferson's administration, however, took the first definitive national action. The 1802 act granting statehood to Ohio contained a clause setting apart a portion of the public lands for the construction of a road from the Atlantic "to the said state, and through the same." This was to be laid out "under the authority of Congress, with the consent of the several states" through which it was to pass.[23] Finally, John Quincy Adams, then a senator from Massachusetts, gave his support to a

general plan of development. He introduced a resolution on 23 February 1807 that required the Secretary of the Treasury to prepare and report to the Senate "a plan for the application of such means as are constitutionally within the power of Congress, to the purpose of making roads, for removing obstructions in rivers, and making canals . . . which, as objects of public improvement, may require and deserve the aid of government."[24] The Gallatin report was the response to a similar resolution passed by the Senate on 2 March 1807.

Gallatin's plan was never adopted, and the Federal Government executed only isolated fragments of an internal improvement program in the first half of the 19th century. Andrew Jackson often has been blamed for the defeat of this unified plan because of his veto of the Maysville Road bill in 1830. This, however, was more than two decades after the Gallatin plan had been placed before Congress. The most logical reason for congressional inaction was the concern about imminent war.

As the nation moved closer to a war with England in 1812, the manner in which federal expenditures were disbursed became crucial. The alternative to direct government construction of internal improvement projects was to subsidize private corporations. By this method, the Federal Government simply became a stockholder of private, state-chartered corporations for the purpose of carrying out improvement projects. This precedent, which was set as a result of the military emergency of 1810-1814, became the pattern for government involvement following the war.

The War of 1812 itself pointed out the need for a system of internal improvements based on national planning. The Navy had been hindered in moving along the seacoast due to the lack of inland navigation, and the Army had been unable to defend the interior adequately due to the lack of roads. The chartering of the Second Bank of the United States in 1816 seemed to provide an opportunity for national economic planning. The debate on the question of internal improvements, however, centered around constitutional issues. President James Monroe in his first annual message to Congress in 1817 recommended a constitutional amendment to give the Federal Government specific authority to construct internal improvements.[25]

The push for improvements continued, and some progress was made in developing orderly methods for their consideration. Individual projects typically were referred to the Senate or House Committee on Roads and Canals. In 1824 a general act directed the government to institute a series of surveys of proposed routes, and reports by the U.S. Corps of Engineers and its Board of Engineers for Internal Improvements began to play an important part in the discussions. Appropriations for surveys, improvements to the navigation of rivers and harbors, and military and territorial roads, however, were made on a piecemeal basis and reflected the concept of individual, independent projects of improvement. Diverse state and sectional interests and a burgeoning philosophy of states' rights after 1816 were decisive in the diminished national planning for internal improvements.

Another area of national planning prior to the Civil War related to coastal fortifications and defense, for which the War of 1812 had demonstrated the need. Prior to that time, the forts that had been constructed in the young nation were of a pre-Revolutionary War design: small, expensive, and temporary in

nature. An example of this type of earthen-walled defense along the Georgia coast was Fort Frederica on St. Simons Island. It was constructed in 1736 and was manned periodically until the end of the Revolution. The typical guns installed in these early forts were light-caliber 24-pounders or smaller.[26] They often were mounted on four-wheel carriages of the kind used on board ships. At the close of the American Revolution, a large number of these installations remained in existence but soon deteriorated.[27]

During the 1790s, the excesses of the French Revolution and the resulting European tensions caused growing concern in the United States. George Washington implored Congress to provide for coastal defenses, and on 28 February 1794 a special committee of the House of Representatives submitted recommendations for the locations and kinds of defensive works that should be built.[28] As a result, the first federal authorization was passed.[29] The construction of what came to be known as the First American System of fortifications followed.[30] Like the pre-Revolutionary forts, these were generally open works with earthen walls over which cannon could be fired. However, while conceived, legislated, and funded at the national level, the First System of fortifications was not exclusively a national program because much of the construction, arming, and manning of these forts was done by individual states.[31]

As a result of mounting tensions between the United States and Europe, in November 1807 a new fortification program was launched, and during the next five years Congress appropriated more than $3 million for its implementation.[32] These installations, which have been designated the Second System of fortifications, were the first major construction to be carried out by American engineers who were regular officers in the U.S. Army.[33] Most of these men were recent graduates of the new Military Academy at West Point, which had been established in 1802 to train engineers in this country.

In terms of developments in Georgia, only one of the various types of Second System architecture was significant — the all-masonry fort. This dramatic departure from previous architectural styles was employed in building Fort Jackson near Savannah and proved to be the forerunner of a new generation of seacoast fortifications that would emerge after 1816. The all-masonry design allowed for greater protection of guns and gunners by locating the gun emplacements behind the thick masonry walls and providing openings (embrasures) through which the guns could be fired. Masonry construction also permitted the stacking of artillery emplacements in multiple tiers, thus increasing the overall firepower of the installation.[34]

Except for the innovative masonry design of Second System forts, the program as a whole provided no significant advancements in comprehensive planning and construction. These defense works were planned and built under the stimulus of a military emergency (that which led to the War of 1812), and received little attention once the emergency had subsided. Not until the organization of a permanent Board of Engineers for Fortifications in 1816 was a national program established that included comprehensive long-range planning and a system of coastal defenses.[35] The Board of Engineers for Fortifications was responsible for determining the coastal locations in need of fortifications, deciding on the design of the forts, and reviewing the operational plans of the Engineers in charge at each site. This new generation of coastal defenses

dominated the development of seacoast fortifications for the next 50 years. Many of these Third System forts, especially in the South, played vital roles in the Civil War.

One unique design of the Third System forts was a small, round, fortified tower. These were known as Martello towers, "a name inspired by the remarkable performance in 1794 of a somewhat similar structure on the Bay of Martello in Corsica."[36] Only a few such structures were completed in the United



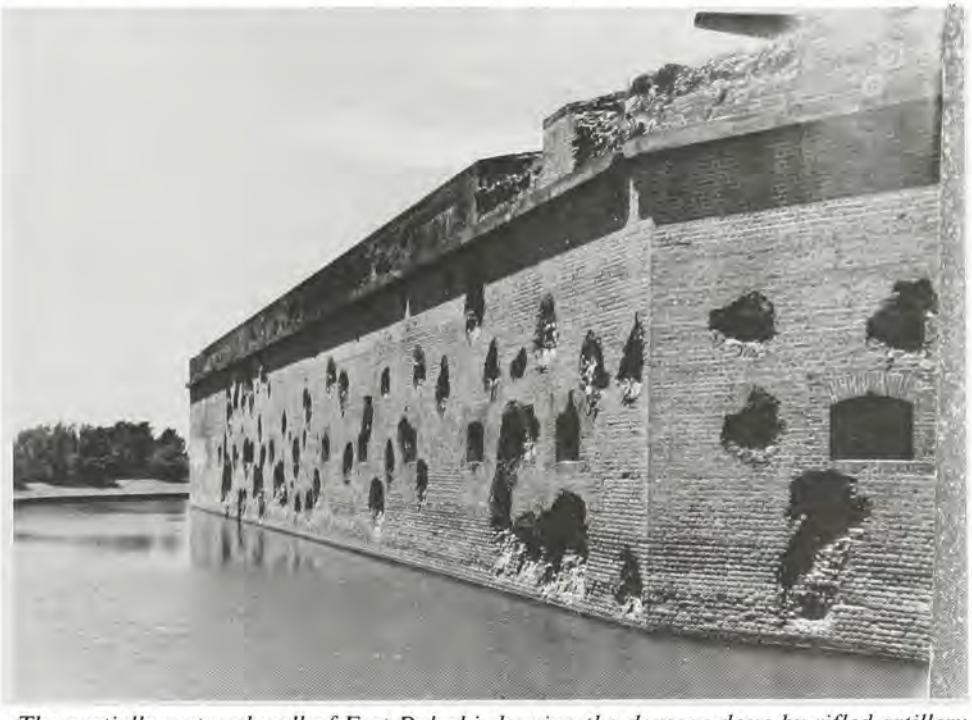
*Martello Tower, Tybee Island, Georgia. Designs and modes of construction of these towers varied considerably from place to place. This example was constructed sometime after 1800 and was intended to provide protection at the entrance to the Savannah River. (National Archives)*

States; one of these was placed on the northern point of Tybee Island off the coast of Georgia near Savannah. The more typical design for seacoast fortifications after 1816 was that of a large, five-sided, multi-tiered masonry fort such as



*Aerial view of Fort Pulaski on Cockspur Island at the mouth of the Savannah River. This excellent representation of Third System defense works served as the example of the vulnerability of these forts under the attack of rifled artillery. (National Park Service, about 1950)*

Fort Sumter in Charleston Harbor, South Carolina, and Fort Pulaski at the mouth of the Savannah River in Georgia. These were considered to be the most modern in design and construction, and the two forts were expected to furnish adequate coastal protection far into the future.[37] Some of the older Second System forts, such as Fort Jackson in Savannah, were even renovated and remodeled according to this design. Unfortunately, the Board of Engineers for Fortifications could not foresee future developments in artillery technology. When the technique of rifling was applied to cannon in the years just prior to the Civil War, the masonry forts became obsolete immediately. "Because of their heightened effectiveness, rifled guns could do significant damage even in single hits, and in this lay their historical triumph over masonry."[38]



*The partially-restored wall of Fort Pulaski showing the damage done by rifled artillery during the seige of 1862. (Georgia Historical Society, n.d.)*

The experience of the War of 1812 sensitized the nation to the need for national planning and a stronger central government. This nationalistic outlook lasted until approximately 1830 and was expressed in such developments as a second national bank, a national road, a move toward national planning for internal improvements, a system of national coastal defenses, and the expansion of the activities of the Corps of Engineers as a national agency for military and civilian works. Before the plans for many of these developments could be realized, however, an ideological conflict arose between those favoring a strong federal government and those experiencing a revitalized sense of state sovereignty.

After 1830 the nationalists tended to gravitate to the newly formed Whig political party and to look upon Senator Henry Clay of Kentucky as their ideological leader. Clay devised what was referred to as the "American System,"

which advocated strengthening the national economy through protective tariffs to stimulate the growth of domestic industry, federally financed internal improvement programs to link the various sections of the country, a national bank to oversee and regulate the national money supply, and federal legislation that would be based on the "loose construction" interpretation of the U.S. Constitution. The strength of the Whig party lay generally in the northeastern and the new western states.

The localists joined the Democratic party, which took Andrew Jackson as its ideological spokesman. The Democrats stressed states' rights; a banking system rooted in state banks; low tariffs to stimulate free trade; a "strict construction" interpretation of the Constitution, which would limit the powers and operations of the national government; and a reliance on "hard" money rather than paper currency. This viewpoint obviously was not conducive to developing a national system of planning. The Democratic party generally found its strength in the older and more self-sufficient agricultural areas of the southern and middle-Atlantic states. Georgia was in this group. The political differences between these two camps created sectional divisions that were healed only by the cauterizing trauma of the Civil War.

These national trends between 1800 and 1865 were reflected both in the activities of the Corps of Engineers and in developments in Georgia. For the Corps, 1824 was a watershed year. Riding the wave of nationalism following the War of 1812, Congress passed the General Survey Act of 1824, which legitimized the civil responsibilities of the Corps. At the same time, Congress passed the first rivers and harbors act, which was a response to repeated calls for the type of national system of internal improvements called for in Gallatin's 1808 "Report on Roads and Canals." These two acts cemented the unique relationship between Congress and the Corps of Engineers that has persisted to this day. The Corps, because of its 1824 congressional charge to survey rights-of-way for national transportation routes and to improve the navigational potential of the nation's rivers and harbors, had become a national agency for both civil and military developments. In that role it continued to respond to the will of Congress.

By 1830, and continuing through the 1850s, the resurgence of localism and the strict constructionist view of the Constitution led to a decline in the civil works of the Corps and in congressional appropriations to finance such works. Sectional controversies, executive-legislative rivalries, disagreements between political parties, a nationwide depression, and strong states' rights sentiments resulted in the repeal of the 1824 General Survey Act in 1838 and in reduced appropriations for Corps projects. While this marked a practical end to national planning and, for several years, to the passage of rivers and harbors bills, the Corps' civil works projects did not stop completely.

In 1838 Congress created the Corps of Topographical Engineers. The "Topogs" had been active in civil works since 1816 as a bureau within the Corps of Engineers. The new corps was to consist of one colonel, one lieutenant colonel, four majors, ten captains, ten first lieutenants, and ten second lieutenants. The authority contained in the General Survey Act of 1824 to employ civilian engineers was repealed in this 1838 legislation.[39] By order of Secretary of War Joel Poinsette, after 1838 all federally directed civil engineering works were

transferred to the Topographical Engineers.[40]

In actuality, the Corps of Engineers continued to be involved in civil works, mainly in river and harbor improvements on the eastern waters. The Rivers and Harbors Act of 1852 revived the Corps activity in this area. The Secretary of War divided the work of improving the rivers and harbors between the Corps of Engineers and the Topogs. The Corps was given charge of improvements on the Atlantic and Gulf coasts, while the Topogs retained charge of those on the western rivers and the Great Lakes.[41] In the late 1850s, however, the bitter sectionalism that led to the Civil War also brought a temporary end to the civil mission of the Engineers. One result of the war that may have benefited the Corps was the reincorporation of the Topogs into the Corps of Engineers in 1863.[42]

## STATE PLANNING EFFORTS

Starting with the colonization of Georgia in 1733, the geography of the region played a vital role in determining both its economic and political developments. The earliest settlements in Georgia began in Savannah and spread along the coastal sounds and estuaries and up the lower reaches of the tidewater rivers. The lack of adequate harbors at the mouths of most of these streams and the shallowness of the coastal waterways prevented ocean vessels from traveling inland. Products, therefore, had to be gathered for export at either Savannah or Charleston. Thus began a fierce rivalry between these two cities for the trade of the interior that continued throughout most of the 1800s.

Georgia's coastal plain, the first area to be settled, extended along the Atlantic Coast for 100 to 150 miles from Savannah to the Florida border. The climate




*Physiographic map of Georgia. (Map drawn by authors)*

in this region was mild, with abundant rainfall and a long growing season.[43] In this region rice, indigo, and cotton were cultivated on plantations worked by slaves. Whereas large vessels could travel up the rivers of Virginia and Maryland and dock at the wharves of the plantations, the streams and passages of lowland Georgia were too shallow to permit navigation by large vessels. Consequently, many small craft were used to collect and transport the produce to the larger centers at Savannah, Brunswick, and Darien. These were the only places along the coast where large vessels could land to sell goods and pick up local products.[44] Roads often were constructed by individuals or counties to supplement transportation by water.

Immediately adjacent to the lowland area and extending in a large semicircle into the interior of the state stretched the pine barrens. This region of sandy, infertile, pine-covered country was home to the state's poorest residents. The area extended from the coastal lowlands almost to the fall line in the interior and from the Savannah River southward to the Florida border. In southwest Georgia the pine barrens stretched as far as the fertile river valleys of the Flint and Chattahoochee. The people in this region were largely self-sufficient. They produced only the barest necessities and had no staple products to export. Occasionally, they made trips to the river towns carrying pelts, poultry, grain, or small amounts of cotton to exchange for coffee, salt, iron, or other necessities that they could not produce at home. Their economy, however, did not create a demand for transportation facilities. This region faced neither the problem of building a system of internal improvements nor of establishing communication with the rest of the world. The real problem presented by the pine barrens was the need to provide a link between the seaports and the interior Piedmont region, thus producing an outlet for the cotton that was growing in great




*Physiographic map of Georgia showing major river systems, the cities located at the headwaters, and the general location of the pine-barrens. (Map drawn by authors)*

quantities in the uplands. At that time, the Savannah, the Oconee, the Ogeechee, and the Ocmulgee rivers were the only links between the extensive agricultural region of the state and the seaports.

The most prosperous and important agricultural section to develop in Georgia was the fertile cotton belt, which included all of the central part of the state from the pine barrens in the southeast to the mountains in the north. In the southwest it included the rich valleys of the Flint and Chattahoochee rivers. This cotton belt provided the impetus for dealing with the transportation problem of Georgia during the first 60 years of the 19th century. The Georgia upcountry was populated by residents coming from the interior of adjacent states, such as Virginia, North Carolina, and South Carolina, rather than by settlers moving up the river systems from the coast. This settlement pattern became the basis for later political divisions within the state that interfered with progress in the area of internal improvements.

Prior to the close of the War of 1812, however, there was no great cry for internal improvements. While the Piedmont settlers had begun to cultivate




*Map of Georgia in 1820 showing the existing counties and the remaining Indian lands. (Special Collections Division University of Georgia Libraries)*

cotton, up to 1815 the plantations were largely self-sufficient.[45] Furthermore, they were close to the waterways that up until then had provided the easiest and cheapest means of transportation. As late as 1818 approximately two-thirds of the market crops of the Piedmont were raised within five miles of a river, and the remainder not more than ten miles from navigable water.[46]

In the years following the War of 1812, however, cotton prices began to rise, and settlers poured into the fertile lands made available through Indian cessions. These conditions meant that planters needed a way to cross the pine barrens in order to get their cotton to the seaports where it could be exported to foreign countries. This need was met partially by the rivers that flowed through the pine barrens, each of which had a major town at its head of navigation where cotton was collected from the surrounding countryside. These streams became inadequate, however, as cotton production increased and heavier loads were shipped. Moreover, it was also necessary to build up a system of improvements within the region itself so that the planters could haul their crops to those towns connected by waterways with the coast. The problem was complicated by the fact that the streams within the section were too shallow and rapid to be of use, and the country was too uneven for canal construction. This fact made the roads, rough as they were, vital in meeting the needs of the cotton planters.[47] The search for a more efficient route to the coast continued until the problem of transporting cotton finally was solved in the 1840s by the advent of the railroads.

The fourth geographical division within the state to determine settlement patterns was the northern or mountain section. This was a region of shallow, rapid streams and broken mountain ranges that was served mainly by roads and, later, railroads. The earliest demands for transportation facilities within this area came from the cotton planters of the Piedmont who needed the mules, grain, and meat of the east Tennessee and the north Georgia regions. Also, the Cherokee Indians retained possession of a large part of this section until 1838. The nature of the country prevented extensive development until the 1850s, when branch tracks of the major railroads were laid through the region.[48]

At the heart of Georgia's transportation problem between 1790 and 1860, then, was the need to connect the increasingly prosperous cotton belt and the interior with port facilities. In its 1826 report to the state legislature, the Georgia Board of Public Works recommended a system of improvements that would focus on selecting and improving a site for a seaport town. The next priority would be to improve the major river systems to the heads of navigation, and then to examine the streams above these points to determine whether they could be adapted for use by smaller boats.[49] Governor Wilson Lumpkin, one of the most ardent advocates of internal improvements in the state, said in his annual message to the legislature in 1832:

> "Let our roads be directed to our towns at the head of navigation; and where it is practicable let our rivers be improved, not only from thence to the Ocean, but as far into the interior as can be effected by reasonable expenditures in the removal of inconsiderable obstructions."[50]

Thus the development of internal improvements in Georgia was influenced strongly by geography, settlement patterns, transportation technology, agricultural activity, and trade. The history of this development falls roughly into three



*Governor Wilson Lumpkin of Georgia, 1835-1836. (Special Collections Division University of Georgia Libraries)*

chronological periods: 1777 until the end of the War of 1812, during which the transportation improvement was left almost entirely to local governments, private individuals, and corporations; 1814 to 1840, which marked both the introduction of state support and efforts to define an effective statewide system of internal improvements; and 1840 to 1861, which featured the increased promotion of railroad construction. For purposes of this study, the first two periods are of particular interest.

From the American Revolution to the end of the War of 1812, internal improvement projects in Georgia were carried out by private individuals and local governments with the state acting as regulator. In 1777 the state legislature passed general road laws that required annual labor service on the roads by all males, white and black, aged 16 to 60. These laws also provided for the election of road commissioners, the defining of road districts, and specifications for road construction. In 1791 the responsibility for the construction and maintenance of roads was transferred to the courts in each county. However, many complaints arose, largely from the cotton producers, about the lack of attention that county officials paid to the roads. The legislature tried to impose further requirements on the system, but few improvements were made. While

the county system failed to work, the legislature took no action to improve it.[51]

Waterway improvement policies prior to 1815 varied greatly but, as in the case of the roadway program, were generally ineffective. An attempt was made soon after the Revolution to extend the roadwork system to the waterways by requiring those males living within a specified distance of certain streams to work at clearing the channels instead of doing work on the public roads. River commissioners supervised work in much the same way that designated commissioners had supervised the early efforts at road building. This method, used on various rivers and creeks until about 1805, was unworkable. It was never tried on the Savannah River, where the general agreement was that skilled specialists were required. A tax was levied for this purpose in 1786 on property adjacent to the river and on South Carolina tobacco being shipped on the river, but it was repealed a year later because it was considered too oppressive. In 1796 a $4,000 lottery was authorized to finance improvement work on the Savannah River above Augusta.

That same year a different arrangement was authorized to provide for work on the Ogeechee River and on Brier Creek, a tributary of the Savannah. The legislature appointed commissioners for these streams, who were authorized to receive money from state appropriations, to solicit private contributions, to conduct a lottery, to levy a special tax on adjacent lands, and to use the timber from adjacent lands without charge. Georgia appropriated $1,150 and $450 respectively for work on the two streams; this was the only direct state support for waterway improvements until after 1815. Lotteries became a common method for raising money for improvement projects, and were authorized for the Altamaha, the Oconee, the Broad, and other rivers between 1798 and 1802.[52]

Because most of these fund-raising schemes produced meager results, the state devised still another — the chartered navigation company. The first of these, the Savannah Navigation Company, was chartered in 1799 to clear the channel of the Savannah River between Augusta and Petersburg at the confluence of the Broad and the Savannah rivers to a specified navigable depth. Similar companies were chartered over the next ten years for the Ogeechee, the Broad, and the upper Oconee rivers. These companies were expected to provide usable channels for commercial traffic, and in return they were permitted to charge tolls for their services. They failed to live up to expectations, however, and their charters were seldom renewed.[53]

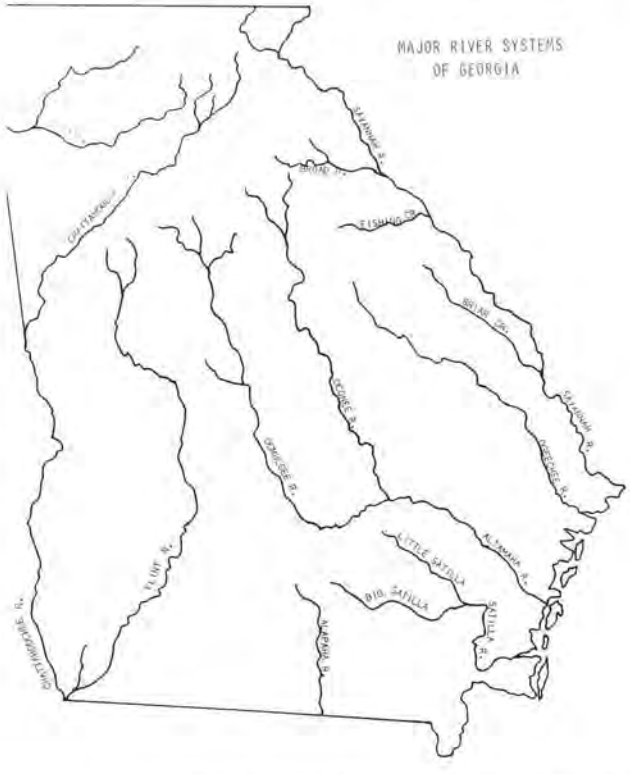
During the entire period from the Revolution to 1815, Georgia's transportation was carried on by the most primitive means as a result of the failures at internal improvements. Most of the produce was carried to and from the plantations by means of boats of various types on unimproved, obstructed streams. The plantations or farms that were not situated directly on streams used wagons to transport their products over crude paths or roads to reach the streams where rafts, boxboats, flatboats, and various other craft carried their goods to a settlement or town for further transportation to the coast. This system of transportation gave rise to towns at the head of navigation on the state's largest rivers. From Augusta, Milledgeville, and Macon, goods that had been transported on small streams and rough roads were shipped to the ports at Darien, Savannah, or Brunswick. Because of Georgia's sparse population,

light trade, and shortage of public funds, the state government chose not to finance an elaborate program of improvements. The measures taken by the State were intended simply to encourage and regulate the efforts of individual citizens. However, Georgians had invested their private capital in lands and slaves rather than making it available for public works.

Beginning in 1817, the opening of land formerly occupied by Indians resulted in a rush to cultivate cotton there. Settlements moved farther away from the streams, and cotton shipments became too large to be accommodated by the earlier primitive methods. Meanwhile, planters in the older regions demanded improvements in order to reduce their marketing costs.

In 1816 the Georgia Treasurer's report cited a $700,000 surplus that could be "applied to such public use as the legislature may hereafter think proper."[54] The report further indicated that $936,558 was due from the National Government in payment for western lands that had been ceded in 1802. Governor William Rabun announced to the legislature in 1817 that he had received $375,000 as a first installment on this debt from William H. Crawford, U.S. Secretary of the Treasury and a fellow Georgian.[55] These funds enabled Georgia to begin a program of state-financed internal improvements.[56]

With expansion creating a demand for public works and the treasury at last able to aid in financing them, the legislature responded by passing an act that appropriated funds for the improvement of river navigation and established a permanent fund of $250,000 to be invested by the Governor with the interest or dividends to be used for internal improvements.[57] The act made funds available




*Major river systems and tributaries of Georgia. (Map drawn by authors)*

for improvements on the Ocmulgee River, the Oconee above and below the fall line, the Altamaha, the Ogeechee, the Savannah and the Tugaloo above Augusta, the Savannah below Augusta, and Brier Creek. Commissioners were named to supervise the expenditures and the works of improvement for each of these designated areas. The act also authorized the Governor to appoint an engineer to examine the rivers named in the act and to report to the Governor on the practicability of improving their navigation.

The State plan was that an engineer continue to supervise all the public works throughout the 1820s. An additional act of the legislature in December 1819 specified that the State Topographical Engineer should survey the rivers of the State with a view to aiding the river commissioners in applying the appropriations for the removal of obstructions found in the streams.[58] Unfortunately, the Topographical Engineer's office was fraught with problems from the start. Because the acts of 1817 and 1819 failed to provide a salary for this position, no one could be employed. In 1820 an editorial appeared in the *Southern Recorder,* a Milledgeville newspaper, deploring the lack of action:

> "It has been two years if we are not mistaken since the office of Topographical Engineer was created — yet the State has no such officer; and why not? Because there is no salary attached to the office, and men of science who can get well paid for their services elsewhere will not serve us gratuitously merely for the honor of holding the appointment."[59]

Not until 1826 was an adequate salary provided for the State's engineer.[60] Governor George Troup hired the English engineer Hamilton Fulton, who had



*Governor George M. Troup of Georgia, n.d.*
*(Special Collections Division University of Georgia Libraries)*

been the chief engineer for North Carolina. Fulton's work consisted primarily of supervising the improvement of river navigation. His activities in Georgia, however, were severely criticized. He was subsequently charged with incompetence, misappropriation of funds, and plagiarizing of technical reports. Although Fulton was cleared of the charges, his aristocratic English bearing and austere manner made him generally unpopular in frontier Georgia, and the legislature abolished the position of Topographical Engineer in 1828.[61]

Although Fulton was the object of criticism, his office was particularly important because it represented the first state effort to sponsor an organized, scientific program of internal improvements. In addition, his surveys were the first to reveal the specific problems. As early as 1826, Fulton was advocating railroads to connect the interior regions to navigable waterways.[62] When the Office of State Engineer was abolished in 1828, the state was divided administratively into an eastern and a western section with a superintendent in charge of road building and river improvements in each section.[63] In actuality, roads received almost exclusive attention to the neglect of river improvements. After this system was abandoned in 1833, Georgia reverted to reliance on private investment supported by state aid to develop internal transportation.[64] By this time the State's economy was well developed, and sufficient private capital was available to ensure the success of Georgia's venture into railroad building.

By the early 1820s, advocates of internal improvements became increasingly disgusted over the meager accomplishments of the river improvement program.[65] Criticism grew as western Georgia was opened to settlement after Indian treaties in 1821 and 1825 and as steamboats began to appear on Georgia's waterways. Few Georgians had adequate knowledge of water improvement techniques, which was borne out by the bumbling of the river commissioners. Their efforts often resulted in money being wasted through poor construction and excessive payments for labor and supplies.[66]

Between 1817 and 1825 the commissioners concentrated on temporary river improvements such as removing snags, rocks, and sandbars, obstructions that would recur after the annual seasonal flooding. The removal of rocky shoals and the digging of sluices were only slightly more permanent improvements. The only example of a permanent improvement during this period was the installation of "pull posts" on the Tugaloo River to aid in upstream navigation. No permanent improvements such as locks and dams, which would have required engineering expertise, were reported.[67]

Dissatisfaction with the program resulted in efforts to create a state board as early as 1821.[68] However, representatives in the western counties opposed the idea. They believed that projects undertaken by a central state agency most likely would benefit only the Savannah, Augusta, and Milledgeville districts at the expense of the whole state. Nevertheless, proposals to set up a board continued. In December 1825 the legislature passed a bill to establish a Board of Public Works.[69] Unfortunately, as in the case of the State Topographical Engineer, the Board of Public Works survived only a short time because of conflicts between the sectional interests. In November 1826, after only one year, the legislature abolished the board with the approval of Governor Troup.[70]

Despite its brief existence, the Board of Public Works made recommendations in its report to the legislature that influenced much of the State's later

activity in river improvements. In 1826, for instance, the legislature appropriated $125,000 for improvements on six of Georgia's rivers. Following the board's recommendation, the bulk of the money was provided for improvements below the fall line. The chief engineer, acting as a general supervisor, was ordered to examine all of the projects before any of the funds could be expended.[71]

New commissioners had been appointed to oversee the removal of obstructions and the deepening of the channel. They employed Fulton, who in 1827 traveled down the Savannah River below Augusta to collect information relative to its improvement.[72] Fulton sent two detailed accounts of his findings and recommendations to the commissioners in 1827. In these he explained the causes for the bars obstructing the channel; detailed a method of removing logs and snags from the channel; explained a procedure that the commissioners could use as an alternative to dredging; detailed the location of logs and bars that hindered navigation; described the ten most obstructive bars and procedures for eliminating them permanently through a system of jetties and embankments; and recommended ways the commissioners could best employ the various types of equipment at their disposal. Although the work was accomplished, the discrepancy between Fulton's cost estimate and the actual expenditures for the work implied that the clearing project was not completed entirely.[73]

Fulton was also ordered to make recommendations to the river commissioners for the Altamaha, the Oconee, and the Ocmulgee rivers. His reports revealed a conscientious attention to his duties, but he could not overcome the fact that some of the commissioners misspent the appropriated funds and ignored the engineer's recommendations. The Ocmulgee River below Macon was an example of this mismanagement. Fulton prepared a six-page report for the Ocmulgee commissioners in which he pinpointed major sandbars and shoals and recommended a method of removal that would eliminate the obstructions permanently. The commissioners ignored Fulton's recommendations. Instead they used state funds to speculate in a boating business and in the cotton market, and provided only minimal river improvements.[74]

Fulton's technical expertise was put to use to a significant degree by the commissioners for the Oconee River. This river needed extensive improvements. While boats bearing 70 tons could reach Milledgeville, the river was generally unusable above that point. Indeed, the entire length of the Oconee was far more obstructed than either the Ocmulgee or the Altamaha.[75] In his report to the commissioners, Fulton stated that effecting any improvements that would make the river navigable for steamboats would be impossible with the limited funds available. The channel was so obstructed by logs and trees between Milledgeville and Carrs Shoals, a short distance above the city, that "200 hands employed for a season would not remove the whole of them."[76] Other places on the river remained impassable, with many areas requiring extensive labor. Aside from removing logs, and rocks, small channels with rapid currents had to be widened, and sharp bends needed to be straightened by clearing and grubbing. Some areas even required the construction of dams and locks. Fulton noted that until some of these major projects were attempted, parts of the river would not be safe for navigation during ordinary summer low water.[77]

The commissioners complied with some of the engineer's recommendations

by hiring additional hands and contracting for the construction of some locks and dams. With this exception, few attempts at expensive, permanent improvements were made. Most of the improvements consisted of removing snags and logs.

Disenchanted with the slow progress of river improvements, the legislators shifted their attention to Georgia's roads. As a result, road construction received much more emphasis during the period 1829 to 1832 than did river improvement. Interest in the river improvement program revived in 1835, however, and by 1840 more than $100,000 was appropriated, mostly for rivers in central and western Georgia. The change in policy resulted partly from the remodeling of steamboats so that they could adapt better to the state's shallow, winding streams and partly from migrations into the western territories of Georgia. During the 1820s, 29 new counties were created, and 17 more were formed in the following decade. In the appropriations for 1835-1836, the legislature designated larger sums for the western rivers than for those in the older sections of the state. The change of direction was especially noticeable in the Altamaha appropriation of $5,000, only one-fourth of the sum authorized in 1826.

The years 1836 to 1840 saw no more significant work in river improvements than that of earlier periods. The primary example of wastefulness during this period was the project to improve the Oconee River. This stream received $10,000 in 1836 for the removal of obstructions below the city of Milledgeville. Five commissioners were appointed to carry out the work, and in 1837 they hired W.R. Bivins as supervisor.[78] Working on shoals, bluffs, and cuts along the river, Bivins and the crew cleared the channels of sand, stumps, roots, and trees. Unfortunately, large trees were often "removed" by sinking them. Furthermore, the crew neglected to make the river permanently navigable by clearing the trees from the banks and riverbed, hardening the banks against erosion, installing flood control dams, and dredging channels through shallow areas. The failure of the project was dramatized when the work crew, returning upstream after clearing the river of obstructions, wrecked one of their boats on an obstruction they had failed to remove.[79] Bivins was dismissed in October 1837, only three months after his appointment.[80]

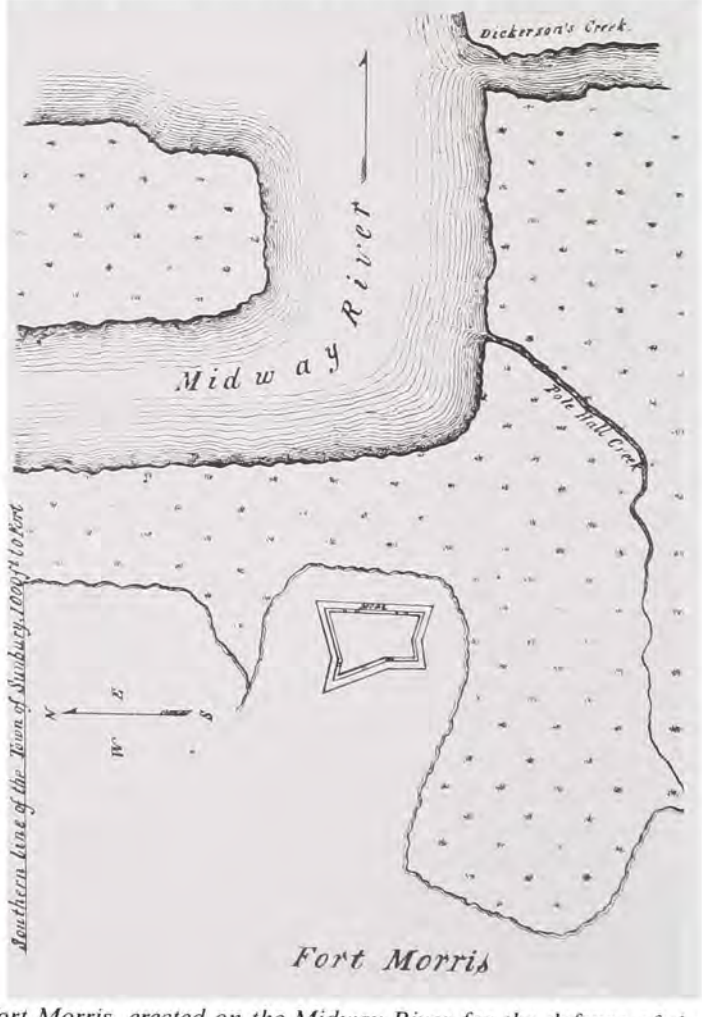
However well intentioned, the Georgia river improvement program, costing nearly one-half million dollars between 1817 and 1840, was for the most part a failure. This was especially obvious in the cases where river commissioners mismanaged the appropriated funds. In addition, the state legislature did not provide a framework for the effective expenditure of state funds, nor did the legislature act promptly in appointing a state engineer to coordinate and supervise the projects. After finally engaging a competent engineer, legislators permitted personality conflicts and partisan politics to bring about his dismissal within two years. Without the guidance of a technically trained engineer, little was attempted beyond temporary improvements. By the late 1820s and early 1830s, the legislature decided to collect all the unspent river appropriations and to concentrate on roads, a much-neglected mode of travel.

The steamboat's increased popularity in the mid-1830s revived demands for river improvements. The legislature in 1835 again relied on the previously unpaid and technically unskilled river commissioners. The renewed program

only repeated past mistakes and failures. For all practical purposes, the State's river operations — sporadic, poorly organized, and impermanent — quietly faded in importance, to be taken up in the 1850s through federal initiatives and directed by the Corps of Engineers.

As in the case of internal improvements, Georgia's involvement in constructing its own system of military defenses was haphazard and sporadic. After the War of 1812, the general peace that settled over the country had caused interest in military defense to decline. This period coincided with the growth of national efforts to establish a system of defensive fortifications. The two factors combined to shift the burden of military defense from local to national programs. Prior to 1812, however, Georgia was compelled to provide certain protective measures because of both the State's frontier orientation and the Federal Government's inability to fill this need. These state efforts were relevant to the activity and involvement of the Corps of Engineers in providing coastal defensive fortifications in the region.

Fort Morris, built during the French and Indian War, was restored in 1776 to




*Fort Morris, erected on the Midway River for the defense of the town of Sunbury. (Savannah District, Corps of Engineers)*

defend the seaport town of Sunbury, south of Savannah, from the attacking British. Sunbury was once an important community in Liberty County, so named because of its inhabitants' fervor in championing the cause of freedom during the Revolution. Georgia's colonial Governor, Henry Ellis, had declared Sunbury a port of entry for the British colonies in America in 1761, second in importance in Georgia only to Savannah.[81] The town was situated on the westernmost bank of the Midway River, where it commanded a view of St. Catherine's Sound eastward toward the Atlantic. Fertile but unhealthy lowlands surrounded Sunbury, whose citizens had early introduced slaves to cultivate rice, indigo, and corn in the marshy fields. They also raised beef and pork and cut timber to be sold to the West Indies and the northern colonies.

Sunbury's importance, however, was short lived. Many of its residents left when the war began. Commerce suffered accordingly, and the attempts to restore trade after the war were only partially successful. In both 1804 and 1824, the area was devastated by tropical storms, and Sunbury eventually became one of Georgia's "dead towns."[82]

At the start of the Revolutionary War, the Council of Safety in Savannah ordered the stores and provisions at Frederica on St. Simons Island to be secured for the cause of the colony of Georgia. The cannons from that abandoned site were transported to Fort Morris to be used in the defense of Sunbury, and Colonel John McIntosh was ordered to reinforce the detachment stationed there "with as many of the battalion as will make a company."[83] Because of the defensive measures taken by the colonists, Fort Morris in 1776 was an imposing fortification. Historian Charles C. Jones in 1878 described it as occupying a well-chosen defensive position. Its guns commanded the mouths of two tributaries of the Midway River. The quadrangular fort was an enclosed earthwork covering approximately one acre. The walls were 10 feet wide and rose 6 feet above the level of the ground, or about 25 feet above the level of the river at high tide. The fort was surrounded by a moat 10 feet deep and 10 feet wide at the bottom.[84]

This fort became the most important military work constructed by Georgians during the Revolutionary War. It won an additional distinction late in 1778 when the British forces, planning to attack Savannah, launched a preliminary diversionary assault on Sunbury. The scheme was to send two forces — one by land and one by sea — from Florida into Georgia. The British had planned to meet near Sunbury but failed to do so. Lieutenant Colonel Louis V. Fuser, in charge of the sea invasion, arrived with his army but could not locate his land forces. Outnumbering the American defenders, Fuser surrounded the fort and demanded surrender. Colonel McIntosh replied by letter that he and his troops preferred to perish in defense of their position. Either because of this defiance or his failure to find the supporting land forces, Fuser withdrew his troops and returned to Florida.[85]

The event encouraged Americans at a time of great stress. Fort Morris's reprieve, however, was brief. The following January, British Colonel Augustine Prevost sailed from Florida with 2,000 troops and laid siege to the fort and its 200 defenders, commanded by Major Joseph Lane. Overwhelmed, Lane surrendered unconditionally. Thereafter, the region around Sunbury was unpro-

tected from the raids of the British, the Loyalists, the Indians, and marauders.[86]

When the British occupied Fort Morris, they changed its name to Fort George in honor of the king. After the war the Americans renamed it Fort Defense. Anticipating the War of 1812, Georgians placed Fort Defense in readiness. The effort was wasted, however. Not a shot was fired from the fort during the years 1812 to 1814, because none of the British warships patrolling the Georgia coast bothered to come up the Midway River. By then Sunbury was no longer considered an important military objective.

A second colonial fort, Fort McIntosh, was erected on the Satilla River in the winter of 1776-1777. Named for Colonel William McIntosh, who supervised its construction, it was the first Georgia fort to surrender and allow its men to be captured. The fort was described as a small stockade, 100 feet square, on rising ground 80 yards from the northeast edge of the river. It had a bastion in each corner and a blockhouse in the center, which served as a lodging for the soldiers as well as a magazine.[87] In January 1777 the fort's new commander became Captain Richard Winn of the Third Regiment, South Carolina Horse.[88] Both the fort and its commander were soon to receive their baptism of fire.

In February 1777 a force composed of Regulars, Loyalists, and Indians under the command of Colonel Fuser moved northward toward Fort McIntosh. At dawn on February 17, 70 Florida Rangers and 80 Indians attacked the fort. For five hours the Loyalists and the Indians continued the assault, but without success. When the British forces demanded surrender, Winn refused, even though one man in the fort had been killed and three wounded. The fighting continued until nightfall, when the British troops encamped a short distance away. Captain Winn sent to nearby Fort Howe for reinforcements, but none were available. The next day Winn's situation became even more desperate when the British were joined by 200 British Regulars. After fighting for several hours, Winn asked for a consultation and agreed to surrender. After their capture, he and his troops were allowed to make their way back to Fort Howe on the Altamaha River, approximately 30 miles to the north.[89] Military historians question the wisdom of the decision to build Fort McIntosh. It was 30 miles in advance of Georgia's main line of defense along the Altamaha River and two days' march from supplies and reinforcements, making the fort highly vulnerable to attack and capture. One suggestion is that local politicians prevailed and had Fort McIntosh built over the objections of the military leaders in order to protect civilian cattle herds.[90]

One of the earliest defenses built to protect Savannah was erected on the eastern edge of the city on a bluff overlooking the river. An act by the Colonial Council on 24 April 1760 named commissioners with full power "to construct and cause to be built a Fort to include the Magazine in the Town of Savannah of such form and space as to them shall be judged most convenient."[91] When the British occupied the city in 1778, this installation, called Fort Savannah, was fortified with 48 cannon and 43 mortars. After the Revolution it was renamed Fort Wayne in honor of General "Mad Anthony" Wayne, the Revolutionary War leader. It soon, however, fell into decay from disuse and disrepair.[92]

Foreseeing a clash between England the United States, the Federal Government in 1808 began seeking places to build fortifications. A Savannah newspaper reported in January of that year that the City Council had ceded to the

United States that area of the city containing the old fort, and that the area was intended as a permanent site for fortifications.[93] In the next two years the United States acquired the private lots in the section, and the Secretary of War stated in his 1809 report that "a regular enclosed fort of mason work was directed to be built on the site of old Fort Wayne, near the town of Savannah, with a battery in front."[94] However, the Federal Government did not follow through with this project. On 3 June 1812 the Savannah City Council resolved that the erection of defensive works by the Federal Government at the site of Fort Wayne was highly and immediately necessary "for the safety of the citizens and their families."[95] The state's senators and representatives in Washington took this petition to the President.

After the Federal Government failed to act, the City Council appealed to the citizens by asking that slaves, money, and materials be supplied for the purpose of strengthening the works at Fort Wayne. Work on the fortifications continued for some time and followed the plan laid out by Major General Thomas Pinckney.[96] No record exists of the use of Fort Wayne after the War of 1812, but in 1837 the site was still a federal possession.

The United States may have lost interest in improving the works at Fort Wayne because attention was directed to a more defensible construction some three miles below the city. In 1808 the Federal Government purchased from Nichol Turnbull "all the wharf lot known by the no. 12. This lot is designated in a general plan of the same by the remains of 'mud fort.' "[97] The 2.3-acre lot was sold for $1,000. By the end of 1809, work on Fort Jackson, as it had been named, had progressed to a point where the barracks had been constructed and were ready for painting.[98] Two years later an engineer's report described the fort as an enclosed work of masonry and mud, mounting six heavy guns, two small brick magazines, and a wooden barracks for one company of officers and men.[99]

During the War of 1812, Fort Jackson was garrisoned by local military units, including the Chatham Artillery. The fort's main function during this period was to serve as a signal station between Tybee Island and Savannah. After the war, the site became the headquarters of the U.S. Health Officer, and until 1827 it was the major quarantine inspection station for the area. The fortification had not been garrisoned by troops since 1815 and was in a dilapidated state when it was destroyed by fire in April 1833. A local newspaper carried a brief notice:

> "Fire — yesterday about one o'clock the buildings at Fort Jackson near Five Fathom Hole, occupied during the last war as a United States barracks, were burnt down. As there were no dwellings near them, the fire must have been the result of design. The buildings were of little value."[100]

With this fire the first phase of Fort Jackson's usefulness ended.

While Forts Wayne and Jackson were not exclusively state efforts at military defense, they represented the second phase of coastal fortifications in which cooperation was necessary between the Federal Government and the local authorities. While both forts were federal possessions, they were garrisoned and to a great extent constructed through local efforts. The partial masonry design of both Fort Wayne and Fort Jackson typified the defenses of the second phase.

As with most of the forts used in the second phase of defense, both Fort Wayne and Fort Jackson were allowed to fall into disrepair and decay as soon as the military emergency had passed. Fort Jackson was later restored and made a part of the nation's third phase of defense to supplement Fort Pulaski. Not until the Civil War did Georgia again find it necessary to construct defensive fortifications as a result of a military emergency.

# 2 EARLY CORPS ACTIVITY IN SAVANNAH

If Georgia was less than successful in developing a program of internal improvements and a system of permanent military defenses, the beginning of the work of the U.S. Army Corps of Engineers in the State was hardly more auspicious. This activity began in 1828 when Major Samuel Babcock reported for duty in Savannah. Babcock had graduated from the Military Academy at West Point in 1808. Before being assigned to Savannah, he had been the Assistant Engineer in the construction of fortifications in New York Harbor (1808-1814); had served in the War of 1812 as the Chief Engineer of the forces under the command of Major General Smith in the defense of Baltimore (1814); had been the Superintending Engineer of the defenses of the Delaware River and the construction of Fort Delaware in Delaware Bay (1816-1824); had served as the Superintending Engineer for the improvements on the Ohio and Mississippi rivers (1824-1826); and had been in charge of lighthouse and pier construction in New Castle Harbor, Delaware (1826-1828). This extensive and varied experience and his promotions in rank indicated that Babcock was a competent and conscientious Engineer officer. These activities, however, also had involved him in two courts-martial and a dismissal from service.

Babcock's first court-martial resulted from his work in constructing Fort Delaware between 1816 and 1824. He was charged and tried in 1824 for making erroneous estimates and for allowing faulty construction. Although the evidence in the case was not sufficient to convict him, neither did it indicate a high degree of competence in the construction of defensive fortifications.[1] After his acquittal, he was reassigned to inspect and report on the contract work being done to improve navigation on the Ohio and Mississippi rivers. In this capacity he was required to work closely with the contractor John Bruce and to report periodically on the progress of the work to Major General Alexander Macomb, Chief Engineer. Babcock was warned that he would be held responsible for the faithful execution of the work as specified in the contract as well as for the accuracy of his assessment of the value of the work done. Macomb added, "The contract, which is presumed to be too clear to require explanation, will be your guide."[2] When Babcock observed that Bruce was doing work that was less than that specified in the contract, he requested instructions from Macomb. Macomb replied rather abruptly:

"It appears to me impossible to make the lst Article of that contract,



*Alexander Macomb, Chief of Engineers, U.S. Army. (U.S. Military Academy Museum)*

> which embraces the points in question, more clear by any attempt at explanation which would be merely a repetition of the language in which the article is couched!"[3]

However, Bruce apparently persuaded Babcock that the contract could be interpreted differently, and the contractor was allowed to continue with the project. When the rivermen along the Ohio became dissatisfied with the quality of the work they requested Babcock's removal and the voiding of Bruce's contract. Macomb agreed that the improvement work on the river indeed violated the contract. He removed Major Babcock from the project and had him arrested. On 7 June 1826 a general court-martial tried Babcock on four charges: neglect of duty, making a false certificate, disobeying orders, and making a false statement in an official report. Babcock pleaded not guilty to all charges but was convicted on all counts. He was sentenced to be dismissed from the service. Executive clemency was recommended because of the unique circumstances of the project and Major Babcock's long service to the country. After reviewing the evidence and determining that Babcock's errors in judgment were caused by his lack of qualifications for the assignment, President John Quincy Adams revoked the sentence and ordered that the major be retained in the service.[4] Babcock then was assigned to the Savannah project.

Two years later Babcock was in trouble again because of his failure to report back to his duty post after being away for the summer. In July 1830 work had been suspended in Savannah because of the danger of malaria and other heat-related illnesses. Babcock went to Philadelphia to improve his health and was expected to return in October. When he failed to do so, even after repeated

urgings from the Chief Engineer, he was arrested.[5] The arrest order, however, was rescinded after Babcock resigned on 20 December 1830. He died in Philadelphia in June of the following year.

The next officer assigned to the project proved to be much more competent and responsible. Lieutenant Joseph King Fenno Mansfield was notified in December 1830 to "repair with as little delay as practicable to Cockspur Island, Georgia, and assume command of the work there in progress under the Engineer Department." He was assured that "your being assigned to this work is considered as a temporary arrangement, but you will be required there at least until next spring or summer."[6] Mansfield remained in charge of the Savannah activities until 1845.



*Joseph King Fenno Mansfield, engineer in charge of the work at Savannah from 1830 to 1845. (The United States Military Academy Archives)*

Joseph Mansfield was born in New Haven, Connecticut, and entered West Point two months before his 14th birthday. He graduated five years later, ranking second in the class of 1822. Prior to his assignment in Savannah, he had been involved in the construction of the defenses for Hampton Roads, Virginia (1828-1830). After leaving Savannah, Mansfield served in the Mexican War as Chief Engineer under General Zachary Taylor. During the Battle of Monterey, he was wounded severely and by the war's end had received several commendations for gallantry and meritorious conduct. Following the Mexican campaigns, he held several assignments until the Civil War erupted in 1861. Mansfield was appointed a brigadier general in the regular service and later commanded the XII Army Corps. During the Battle of Antietam on 17 September 1862, he rode to the front of the battlefield, where the firing was heaviest, in order to encourage his wavering troops. There, "with sword waving over his head, cheering his

men to victory,'' Mansfield was wounded. He died the next day.[7] After his death it was said of him:

> He was ever ready to help the needy, and often to the sacrifice of his own and his family's comfort. His sympathy was extended to all in affliction, and no needy one was ever turned away with an empty compliment; the name of citizen was dearer to him than that of soldier.... He gave himself entirely to the service of his country; whatever she required, that was law to him.[8]

The next officer to play a significant role in the activities of the Corps of Engineers in Savannah was Jeremy Francis Gilmer. Gilmer graduated from the Military Academy in 1839, ranking 4th in a class of 31. He had served as an



*Silhouette likeness of Jeremy Francis Gilmer, engineer in charge of the work at Savannah from 1848 to 1858. (The United States Military Academy Archives)*

Assistant Professor of Engineering at West Point (1839-1840), as Assistant Engineer in the building of Fort Schuyler in New York Harbor (1840-1844), and as Assistant to the Chief of Engineers in Washington, D.C. (1844-1846). During the war with Mexico, Gilmer was appointed Chief Engineer of the Army of the West in New Mexico and helped in the construction of Fort Marcy at Santa Fe, New Mexico. In 1848, after being involved briefly in repairing Forts Madison and Washington in Maryland, he reported to Savannah. For the next 10 years, Gilmer was the Superintending Engineer of the Corps activities in the Savannah area. At the outbreak of the Civil War, he was the Superintending Engineer for the construction of the defenses at San Francisco Bay in California. Gilmer resigned his commission in the U.S. Army Corps of Engineers in June 1861 to join the Confederacy.

Jeremy Gilmer was born in Guilford County, North Carolina, in 1818. His first Confederate duty was as Chief Engineer to General Albert Sidney Johnston. At the Battle of Shiloh, Gilmer was wounded in the same engagement in which Johnston was killed. In 1863 Gilmer was promoted to major general and became Chief of the Engineer Bureau of the Confederate War Department. In that capacity he helped lay out the defenses of both Charleston and Atlanta. One of his biographers referred to him as "perhaps the outstanding military engineer in the service of the South."[9] At the close of the Civil War, Gilmer moved to Savannah, Georgia, and from 1867 until his death in 1883, he was president of the Savannah Gas Light Company. His grave is in Laurel Grove Cemetery in Savannah, the city he came to love during his tour of duty there as a young Engineer officer.[10]

Other officers from the U.S. Military Academy served briefly in the Savannah area, and some of these went on to significant accomplishments after their Savannah assignment. Perhaps the most notable was Robert E. Lee. Lee gradu-



*Robert E. Lee. When Lee was fresh from the Military Academy, he was assigned to assist in the work on Cockspur Island at the mouth of the Savannah River. (Savannah District, Corps of Engineers)*

ated from West Point in 1829, ranking second in his class. His first assignment was to "report to Major Samuel Babcock of the Corps of Engineers for duty at Cockspur Island in the Savannah River, Georgia."[11] Lee arrived at this post in November 1829 and, because of the problems concerning Major Babcock, was forced to assume much of the responsibility for the work there. Soon after Mansfield arrived at Cockspur Island, Lee left for another assignment.

Between 1831 and 1861, when he resigned his commission to join the Confederacy, Lee was active in construction of defensive fortifications at Hampton Roads and New York Harbor; was involved in improvement of navigation on the Missouri and upper Mississippi rivers; served as Assistant to the Chief of Engineers; and saw duty in the Mexican War. In 1859 he commanded the forces at Harpers Ferry, West Virginia, that suppressed the raid of the notorious abolitionist John Brown.

In the course of his work on navigational improvements on the western rivers and waters, Lee became concerned about the need for internal improvements. In 1840 he wrote to John Mackay, a friend in Savannah, noting that Congress had adjourned without making any appropriations for civil work. Lee regretted that this inaction probably would halt work during the coming year. He felt his only alternative was to return to his western post, sell all the boats and other public property connected with his work there, and close out his operations. Lee lamented the fact that his boats and equipment "have laid up two years already and I think it will be many years before the United States resumes the system of internal improvements, if ever."[12]

Mackay, who had been a classmate of Lee's at West Point, was assigned to Savannah at the same time as his friend (1829-1830). He was a native of the city and a descendant of the colonial family of Scottish Mackays who had been active in the military affairs of Georgia since the 1730s. Much of his military career was spent in the Georgia-Florida area. He was assigned to the Topographical Bureau and did topographical duty in both states from 1831 until his untimely death in 1848 at the age of 42. Between 1839 and 1847, Mackay was the Superintending Topographical Engineer for the river and harbor works in southern Georgia and northern Florida.

William Henry Chase Whiting, who had graduated first in his class at West Point in 1845, was another young Engineer officer who served briefly in Georgia. He later resigned his commission to serve in the Army of the Confederacy. His Engineer duty prior to his Savannah appointment included fortification construction in Pensacola Harbor, Florida; in San Francisco Harbor, California; and at Forts Caswell and Macon in North Carolina. He also was active in river and harbor surveys and improvements in Texas, North Carolina, and South Carolina. Between 1857 and 1861 Whiting was the Superintending Engineer for the construction of Fort Clinch on Cumberland Sound, Florida, as well as supervisor of the repairs to Forts Pulaski and Jackson in Georgia. He also was involved in navigational improvements on the Savannah River. At the outbreak of the Civil War, Whiting resigned his commission in the U.S. Army and joined the Confederacy. As a major, he served as Chief Engineer in General Joseph E. Johnston's Army of the Shenandoah. He later was promoted to brigadier general and put in command of a division. After failing to get his troops into action during the Battle of Petersburg in 1864, he was accused of being under the influence of alcohol or drugs. After being severely wounded at Fort Fisher in North Carolina in 1864, Whiting was taken prisoner. He died two months later.[13]

The geographical area over which all of these officers had charge was ever changing. At first limited to the defensive works on Cockspur Island in the Savannah River, the activity expanded to include navigation improvements on



*Panoramic view of the city of Savannah in 1837. (Special Collections Division University of Georgia Libraries)*



*Oglethorpe Barracks, headquarters for the Savannah Corps of Engineers activity prior to the Civil War. (Savannah District, Corps of Engineers)*

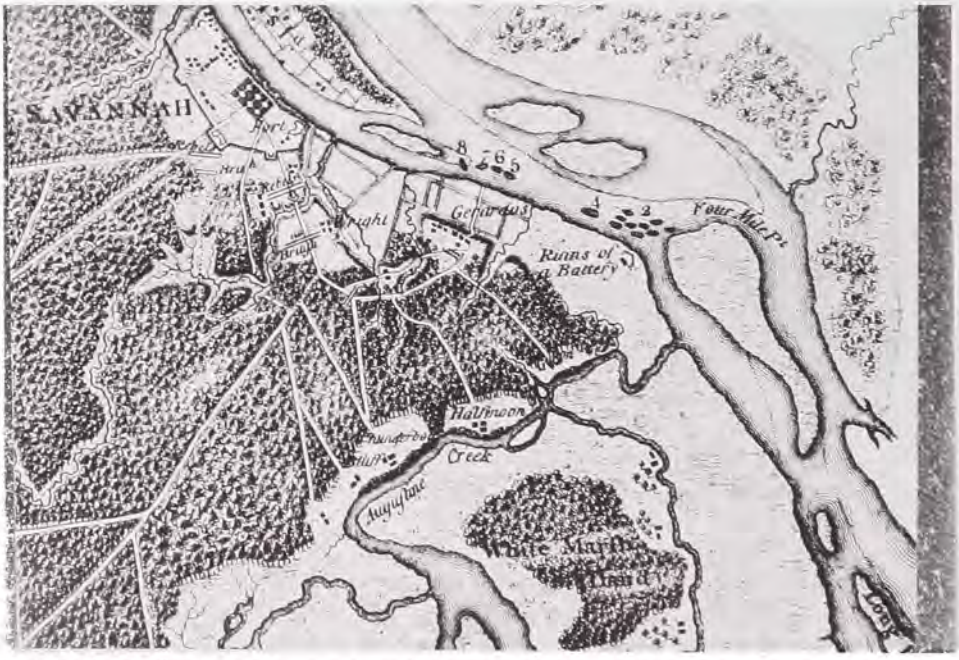
that river from its mouth to the city of Savannah. At various times between 1830 and 1861, the Savannah Superintending Engineer was responsible for the work on defensive fortifications in Charleston Harbor, at Cumberland Sound on the Georgia-Florida border, and on the Savannah River. River and harbor improvement projects included those in the harbors of Savannah, Charleston, and Brunswick; at the mouth of the St. John's River in Florida; on the inland rivers of the Ocmulgee and upper Savannah rivers in Georgia; and on the inland passage between Cumberland Sound and the St. John's River in Florida. Because of the increasing amount of Engineer responsibility and the chronic shortage of Corps officers, much of the work was only partially completed.

## CORPS ACTIVITIES IN INTERNAL IMPROVEMENTS

The regional and political divisions in Georgia complicated state efforts at internal improvements. After 1830 the State, for the most part, turned its attention to developing roads and railroads. At the same time, the Federal Government, through the Corps of Engineers, became increasingly involved in navigational improvements on the nation's waterways. This Corps activity in Georgia was manifest in the work of the Savannah post.

On 18 May 1826 Congress had appropriated $50,000 "to be applied under the direction of the President of the United States to remove obstructions in the river Savannah, below the city of Savannah."[14] These funds were to be disbursed by a local agent, Dr. W.C. Daniell, who was approved by the Treasury Department and expected to report regularly to that department concerning the progress of the work and the expenditures. Because this was the first congressional appropriation for this purpose and because the project was submitted and generally followed by Daniell, a precedent was set for later plans for improvement in the channel.[15]

The major problem involved in navigating the river concerned a portion of the channel below Savannah known as "the Wrecks." Two factors contributed to the obstructions. First, at this location vessels were sunk twice during the




*Detail of a 1780 map of Savannah and the surrounding environs drawn by Col. Archibald Campbell and showing the obstructions placed in the river in order to impede an invasion by the British during the Revolutionary War. (Coastal Heritage Society)*

American Revolution in order to block the channel from British attack. Later, after the British had captured Savannah, several other obstructions were placed at the same location to impede the threatening French fleet. These obstructions in time caused a sand bank to form.

The second factor contributing to the formation of obstructions at this site

was the nature of the channel itself. From some distance above the city to its mouth, the river is studded with marsh islands. These divide and subdivide the current, creating numerous channels that vary in depth and width. Opposite the city of Savannah lies Hutchinson's Island, which divides the channel into a southern course, known as Front River, and a northern course, known as Back River. Although Front River passes the city and is the main channel, much of the water flows through Back River, bypassing the city. These channels meet south of the city at the location known as the Wrecks. The eddy formed at the junction of the channels causes further accumulations of sand and silt. Clearing the channel at that site would involve both removing the accumulated deposits and preventing future silting. Daniell proposed to do this by dredging, by removing the remnants of the sunken vessels, and by building dams to close the connecting channels between Back River and Front River to provide a scouring effect in the channel. Although he failed in accomplishing any of these objectives, Daniell's plan remained under consideration for the next 30 years.

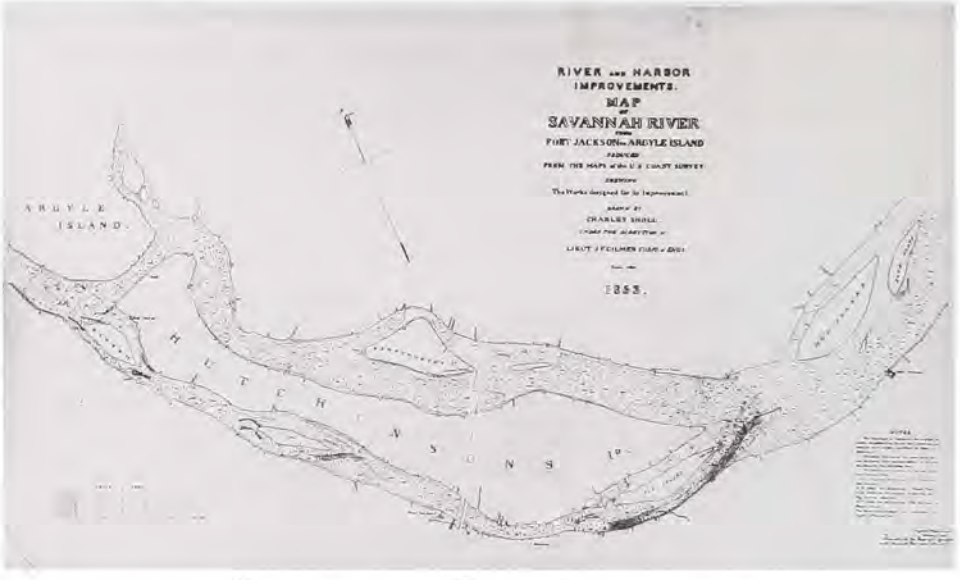
Lieutenant Mansfield was instructed in November 1832 to conduct "a survey and make soundings of that river from about five miles above Savannah to its mouth."[16] Because his orders had called for an exact survey, Mansfield requested assistance in the form of an additional officer and equipment. He was assured that an application would be made for an officer to make the necessary survey and that that portion of his request relating to "the plans heretofore pursued in the improvement of the said river will be referred to the Treasury Department under which it was formerly prosecuted."[17] Lieutenant Mackay arrived in Savannah in 1833 to conduct the river survey, which he completed by the end of fiscal year 1834.[18] Very little actual work was accomplished, however, because in 1835 construction on the dam that was to close the channel connecting Back and Front rivers was ordered halted. This action resulted from the Treaty of Beaufort, signed in 1787 by South Carolina and Georgia.[19] Mansfield requested instructions concerning this stalemate and was informed by the Chief Engineer that a copy of the two articles of Convention between South Carolina and Georgia establishing their respective boundaries had been laid before the President

> by whom I am instructed this date that as the channel between Argyle and Hutchinson's Island is by the second of those articles forever to be kept open the U.S. have [*sic*] not the power to close it up without having previously obtained sanctions of the parties to that Convention.[20]

When John Mackay became Superintending Topographical Engineer in charge of improvements on the Savannah River in 1839, he proposed a plan to foster the free navigation of Back River and to cause the water in the channel of Front River to increase in velocity enough to keep it open. Mackay could not foresee any group or individual objecting to this plan "under any law or treaty."[21] Lack of congressional appropriations for the next several years prevented any improvement work from being conducted. When Mackay's health began to fail in 1841, his activities diminished. His proposal, which was to construct piers or pillars with spaces between them rather than to build dams, was never implemented.

Not until 1855 did attention again turn to improving navigation on the Savannah River. Congress on 3 March appropriated $161,000 to remove the

obstructions in the Savannah River "placed there during the revolutionary war [*sic*] for the common defence [*sic*]."[22] In his proposals concerning the expenditure of these funds, Lieutenant Gilmer quoted from a February 1853 report by a federal commission organized to examine the Savannah River and to recommend a project for its improvement. The report proposed dredging at the Wrecks to provide a channel 300 feet wide and at least 10 feet deep at mean low tide; dredging along the southern edge of Garden Bank just below the city simultaneously with the dredging at the Wrecks; closing the channel between Hutchinson's and Fig islands by constructing a pile work to divert the water in this channel down the ship channel and across the dredged areas; building a



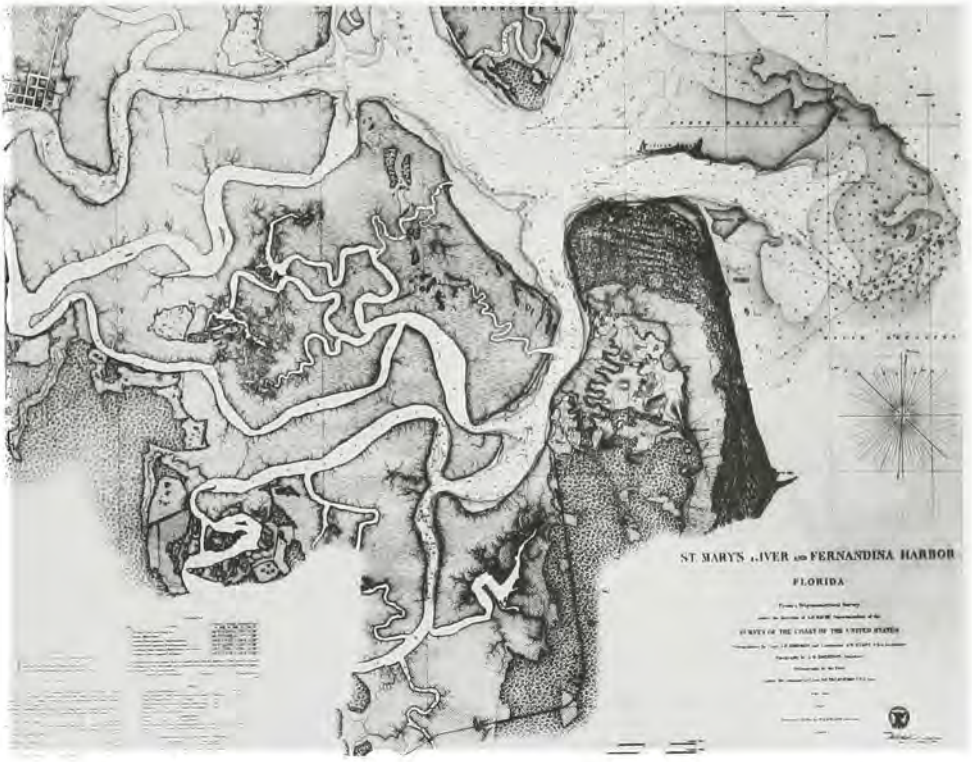

*An 1853 map of the Savannah River from the Cross Tides to Fort Jackson and showing the works proposed for its improvement by Lt. J.F. Gilmer. Note that most of the work was to be concentrated along the Garden Bank and Wrecks channel (opposite Fig Island). (Savannah District, Corps of Engineers)*

2,240-foot jetty of pile work from the lower end of Fig Island to deflect a portion of the tidal flood current from the Back River to Front River; and, if necessary, dredging the channel of Front River above the city to a depth of 8 feet and a width of 200 feet in order to provide a greater volume of water flowing down that route.

Gilmer's recommendations to continue this project with only slight modifications were rejected, however, by Secretary of War Jefferson Davis. He cited the wording of the congressional act, which failed to provide for the construction of jetties or pilings or for dredging the channel.[23] The lack of clear authority for the work was resolved by another act of Congress on 7 August 1856, which specified that the unexpended appropriation from the act of 3 March 1855 could be applied, under direction of the Secretary of War, to remove bars, shoals, banks, and other impediments in the river as cited in the commissioners' report of February 1853.[24] Improvement work proceeded without interruption. Lieutenant William Whiting reported in 1860 that Gilmer's program of work on

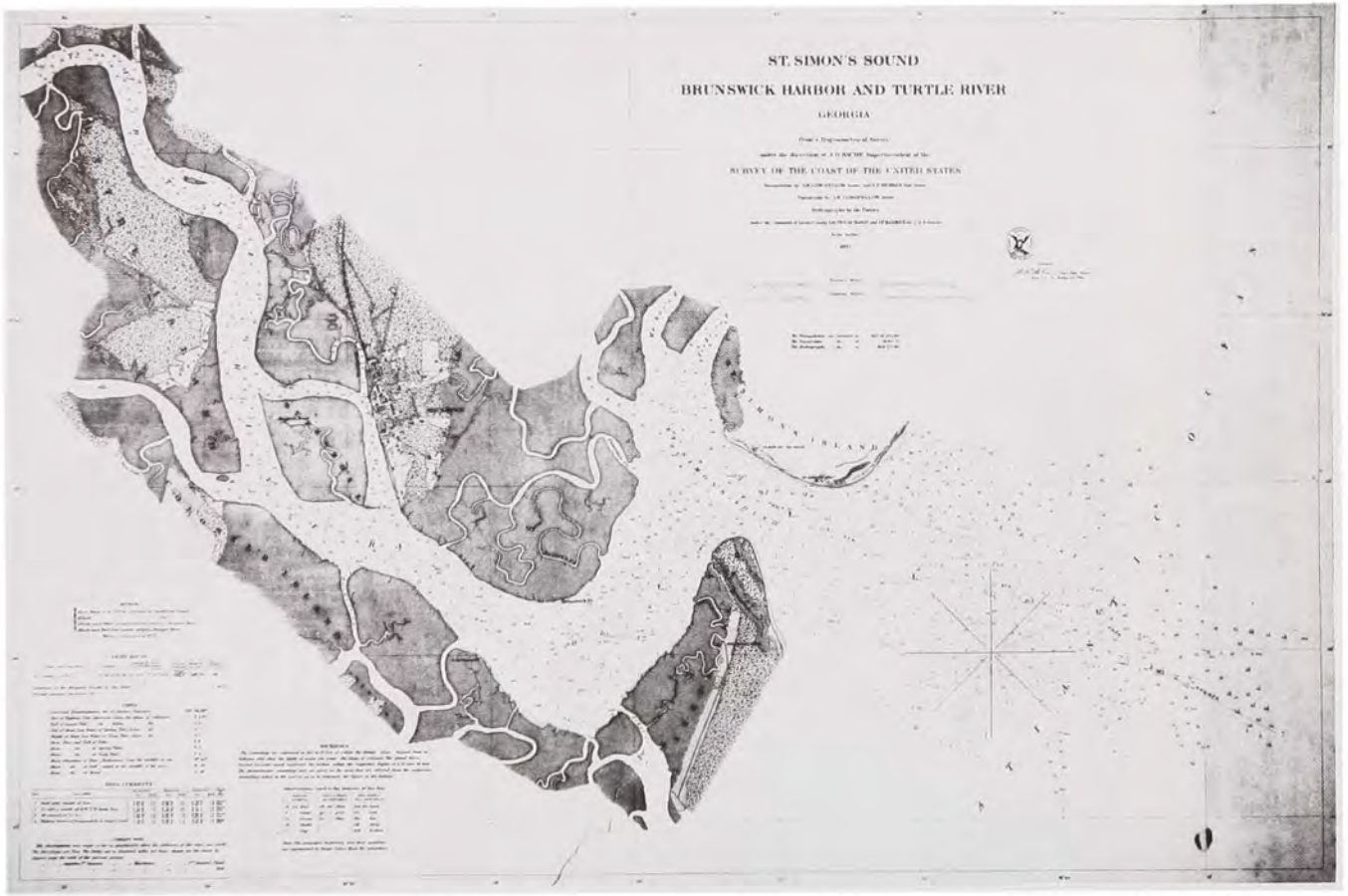
the Savannah River improvements had been completed successfully and that he was about to discharge the laborers and to secure and overhaul the machinery.[25] Ironically, all progress was undone during the Civil War when the river channel below Savannah was obstructed again by Confederate forces as a measure of defense for the city.

In addition to improvements on the Savannah River, the Savannah Engineers were in charge of other works for improving water navigation. In March 1835, Mansfield was ordered to implement an act of Congress for opening an inland passage for steamboats between St. Mary's River and St. John's River, Florida.




*Map of Cumberland Sound and Fernandina Harbor done in 1857 as a part of the United States Coastal Survey conducted by A.D. Bache. Also included on this map is a portion of the Inland Passage which received the attention of the Corps of Engineers in their attempt to improve navigation prior to the Civil War. (George T. Davis, Amelia Island, Florida)*

Lieutenant Mackay was to be detailed as Mansfield's assistant. Mansfield requested an additional officer but was informed that none was available.[26] Colonel James Gadsden of Tallahassee, Florida, serving as the agent for the Federal Government, had supervised the work on the inland passage from 1828 to 1833, following the plans developed by Brigadier General Simon Bernard in 1828. In that year he ceased acting as U.S. agent, and the work on the inland passage was suspended until the navigational improvements on the Savannah River ended. The two dredging machines in use there then could be transferred to the inland passage between the St. Mary's and the St. John's rivers.[27]




*Map of Brunswick Harbor and St. Simons Sound done in 1860 as a part of the United States Coastal Survey. (Special Collections Division University of Georgia Libraries)*

Following pressure from Florida residents and from congressional representatives from that territory, the Chief Engineer in 1835 assigned the work of completing the inland channel to Lieutenant Mansfield. In submitting his report in October 1836, Mansfield noted that he had had little time to develop a comprehensive project for improvement. Lieutenant James T. Williams reported for duty to assist on this project in December 1835, but within two months he had been released from Engineer duty. Though shorthanded as a result of Lieutenant Mackay's being reassigned in 1836, Mansfield continued to supervise the work on the inland passage until 1839. At that time the work was assumed by Mackay, who had been promoted to captain in the Corps of Topographical Engineers. The project was completed under the direction of the Topogs.

Some early attempts were made to improve the harbor at Brunswick, Georgia, by an appropriation of $10,000 in 1836. After visiting the site and examining the bar to be removed, Lieutenant Mansfield concluded that "the funds appear inadequate for the object in view." He therefore recommended that work await further appropriations.[28] Two years later Captain Mackay submitted the same recommendation.[29]

On 30 August 1852 Congress appropriated the first funds for work on the Savannah River above Savannah. The act provided "That the Secretary of War cause to be examined and surveyed the rivers of Savannah, from the city of Savannah, as high up as the city of Augusta" as well as "the Ocmulgee up to Macon," and report to Congress on the amount of money that would be necessary to remove any obstructions to navigation.[30] Lieutenant Gilmer's work on the Savannah River began at Augusta in 1853. When spring rains hampered work for a month, he used the period to collect all available maps of the river. The field operations were completed about the middle of May, and several months were spent preparing a general map of the river from Augusta to Savannah. According to Gilmer's report, the principal obstructions to navigation were bars, formed where the channel widened, and snags and rafts of driftwood lodged against the concave banks at the bends in the river. Some of the sandbars at the upper section of the river in the first 25 miles below Augusta were found to be impassable for boats drawing more than 2.5 to 3 feet of water during the lowest stages of the river, and not more than 4 feet could be relied on throughout any summer. In some places, the channel was so crooked and narrow that boats of the smallest draft were in danger of becoming grounded.[31]

Gilmer recommended that the snags and rafts could be removed from the channel by using a shallow-draft boat provided with machinery for cutting and raising the logs and brushwood. He indicated the locations of sandbars and specified the types and costs of improvements that should be constructed. Gilmer proposed reducing the shoals and removing the obstructions at an estimated cost of $70,000. This was by far the most comprehensive survey ever made to improving navigation along the entire course of the river between Augusta and Savannah. Unfortunately, the Civil War interfered with implementing these improvements.

While Gilmer was serving as the Superintending Engineer in Savannah, he also was responsible for navigational improvements in the Charleston Harbor. In this role he helped supervise the design and construction of a new type of

dredge. Designed by Jason C. Osgood, the first hopper dredge in the United States was so called because it contained its own "well holes," where the dredged materials were deposited for transport to a dump site. For this reason, the new dredge was much larger than previous dredges that had depended on "tender-boats" to transport the dredged materials. Osgood's dredge, however, did not perform well and he terminated his dredging contract within two years.[32]

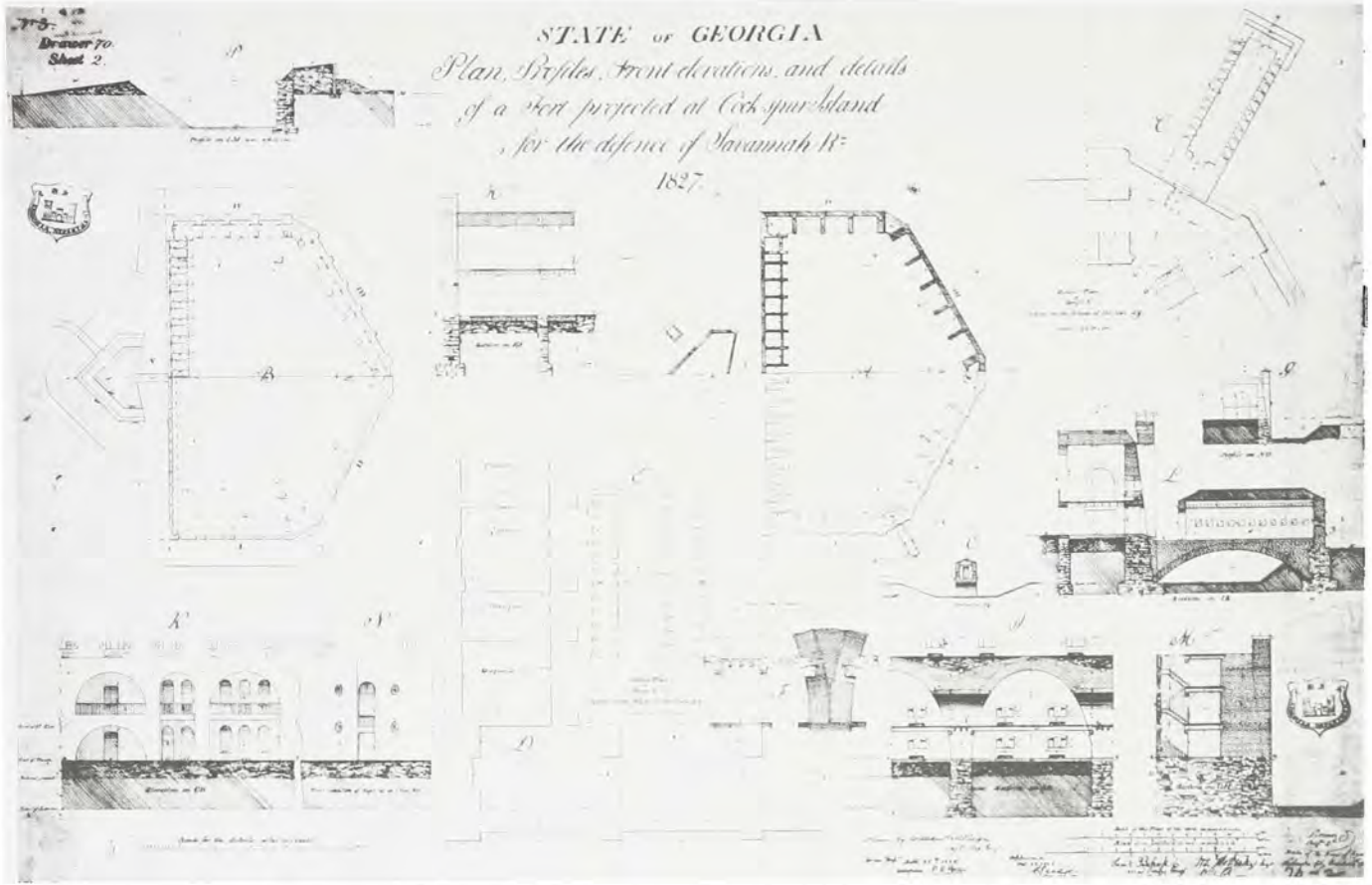
## CORPS ACTIVITIES IN DEFENSEIVE FORTIFICATIONS

As might be expected, the most significant and permanent contributions the Corps of Engineers made in the Savannah area were in military construction. This was the reason for the first Corps work in coastal Georgia, and it continued to be the primary concern of the Savannah Engineers for many years. Military work included the building of Fort Pulaski on Cockspur Island, the repair and remodeling of Fort Jackson on the Savannah River, and the building of Fort Clinch on the northern point of Amelia Island in Florida. In addition to these long-term projects, the Savannah Engineers were involved sporadically in the construction and repair of the fortifications in Charleston Harbor and in the repair of the fort at St. Augustine, Florida.

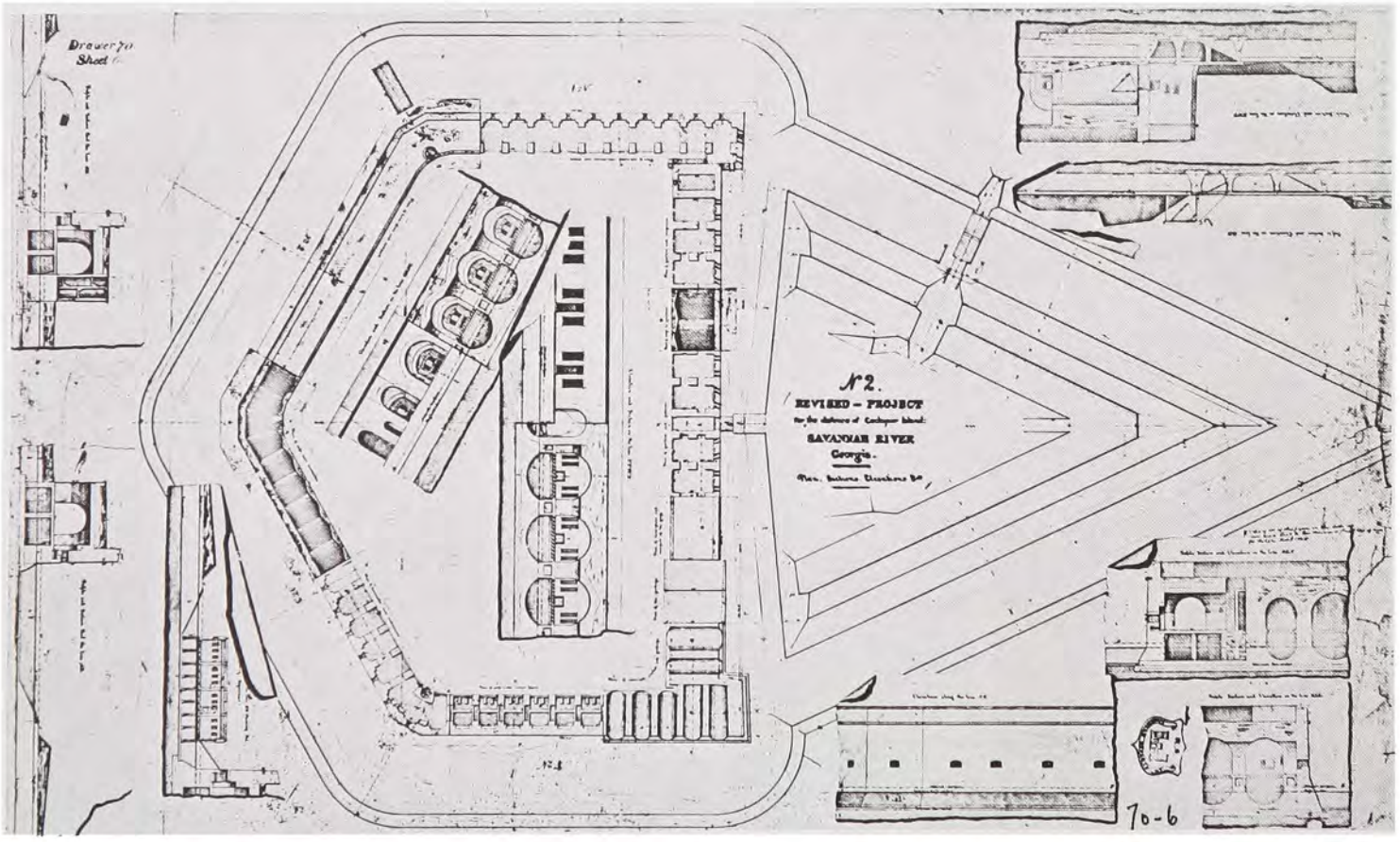
Lying at the mouth of the Savannah River, Cockspur Island has been significant in the development of coastal defense planning not only for Georgia but for the Nation. Prior to the construction of Fort Pulaski, two other forts occupied this small marsh island. Fort George, a palisaded log blockhouse and earthen fortification, was begun in 1761 by the Georgia colonial government to defend the harbor of Savannah and to enforce customs and quarantine laws. This early fortification, partially destroyed by storms, was dismantled by the Americans in 1776 upon the approach of the British fleet. After the Revolution new defenses were needed for the Savannah River, and the United States in 1794 and 1795 erected Fort Greene, named in honor of General Nathanael Greene, hero of the American Revolution. The life of this First System fort was brief; in 1804 a hurricane demolished its battery and barracks.

A masonry Third System fort was planned for Cockspur Island as early as 1819. The experiences of the War of 1812 had revealed the weakness of American coastal defenses, and in 1816 Congress created the Board of Engineers for Seacoast Fortifications. The board was responsible for devising a new system of national defense. Brigadier General Bernard, who was associated with the board from 1816 to 1831, developed preliminary plans for the Cockspur fort in 1827. Work began two years later when Major Samuel Babcock was assigned to the site. During 1829 and 1830, Major Babcock was occupied mainly in preliminary work on the project. This included making topographical surveys, building temporary quarters for himself and the workmen, building a dock on the north channel, installing a drainage system around the fort site, and excavating for the fort's foundations.[33] After accomplishing relatively little work on the fort itself, Babcock resigned. The project was assigned to Lieutenant Joseph Mansfield.

When Lieutenant Mansfield reported in January 1831, he was confronted with the fact that Major Babcock had conducted the work in an inefficient, if not incompetent, manner.[34] Not only were Babcock's surveys and site selections lacking, but the excavation for the fort's foundation was on such an




*Original plan for the construction of Fort Pulaski on Cockspur Island. Note that these original drawings call for a double tier of casemated gun emplacements as well as a barbette battery on the terreplein. (Savannah District, Corps of Engineers)*




*Plans for the revised project to be constructed on Cockspur for the defense of the Savannah River. These revised drawings eliminated the multiple tiers of casemated emplacements, thereby reducing the weight of the construction. (Savannah District, Corps of Engineers)*

inappropriate site for defense that Mansfield had it moved. He also pushed for two main changes in the plan for the fort's foundation. Mansfield cited the need for pilings to support the tremendous weight of the structure on the marshy ground and recommended substituting brick for stone in the foundation.[35] As a result of these recommendations, the Board of Engineers in September 1831 revised the plans for the Cockspur project. The fort was built largely during Mansfield's administration. In 1833 it was named Fort Pulaski in honor of Count Casimir Pulaski, the hero of the American Revolution who had given his life in the defense of Savannah.

Construction on Fort Pulaski continued more or less continuously from 1829 to 1847, with the exception of some brief periods when congressional appropriations were insufficient or nonexistent. It was a huge project requiring large quantities of lumber, lead, lime, iron, timber, sand, and other building supplies at a cost of nearly $1 million. In April 1847 Lieutenant Barton S. Alexander, who had succeeded Mansfield in 1845, announced to the Engineer Department that "everything in, about, or pertaining to the main work and its works is complete, and they are now ready for their entire armament."[36]

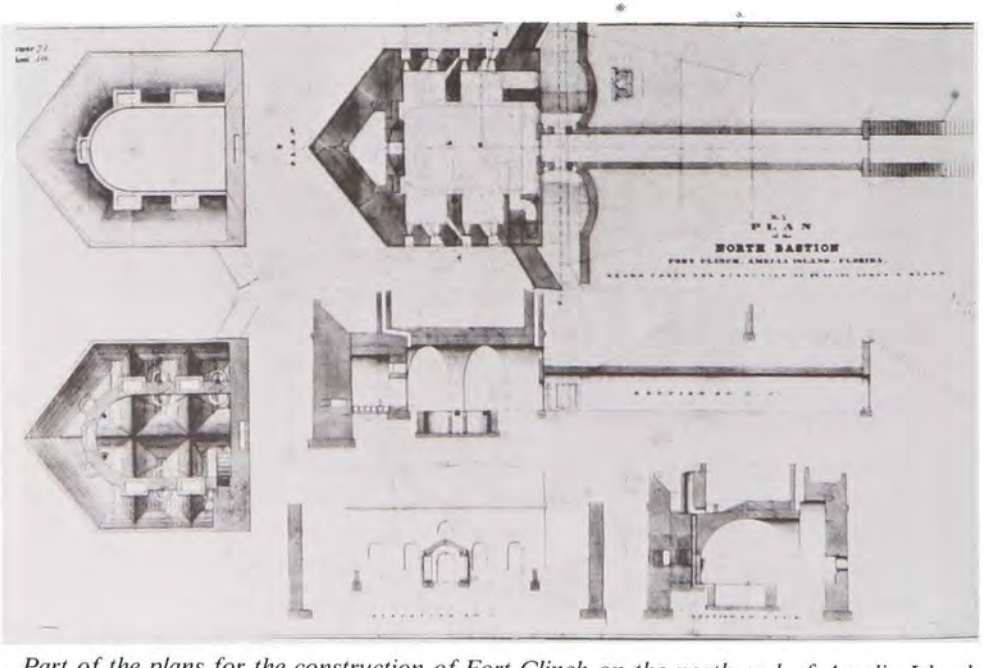
The fort faced seaward and was encircled by two moats spanned by drawbridges. The western, land-oriented side of the fort was protected by an earthwork. The fort could be entered only through the demilune and a vaulted brick gateway called a portcullis. Inside, the parade area was surrounded by officers' quarters, barracks, and fortified arched chambers called casemates. Each of these casemates was designed to mount a cannon that could be fired through an embrasure, or opening, in the outer wall. This five-sided structure was built entirely of brick with walls 30 feet high and from 7 to 11 feet thick. The arched casemates and other enclosures built onto the walls were roofed with lead sheets covered by a four-foot layer of sand. This formed a terreplein, or platform, to protect the casemates and to permit the emplacement of a second tier of guns that could be fired over the top of the outer wall, or parapet. A unique feature of the terreplein was that it was designed to allow rain to filter through the sand and run through a system of pipes to be collected in huge cisterns located under the floors of the casemates. This was intended to provide a constant supply of fresh water for the garrison.

Except for repairs and maintenance, between 1847 and 1861 no major construction was carried out on the fort. The maintenance work consisted mainly of cutting weeds and grass, grading and regrading the embankments, clearing out the ditches, painting the battery casement bulkheads and quarters, and performing general repairs after storms such as the hurricane of 1854.[37] In reality, the fort was never finished. It was never garrisoned due to the damage of the 1854 storm, and the full complement of its armament, which was to include 140 guns, was never installed because of modifications that were made in the emplacements in 1855. In 1861 only 20 cannon had been mounted, and the fort was manned by only one sergeant, who served as caretaker.

Responding to a 3 March 1845 act of Congress providing funds for repairs to Fort Jackson near Savannah, Lieutenant Mansfield inspected that installation and in June submitted a plan for its renovation.[38] His report indicated that the fort's foundations were in good condition but that much of the upper works required extensive repairs. This report, coupled with the nearly completed state



*Aerial view of Fort Jackson in the Savannah River. (Savannah District, Corps of Engineers, n.d.)*




*Part of the plans for the construction of Fort Clinch on the north end of Amelia Island, Florida. These plans were drawn in 1851 by Joseph G. Totten. (National Archives)*

of Fort Pulaski and the impending conflict with Mexico over the annexation of Texas, caused the War Department to have the old fort put into a state of readiness. Casemate storerooms, a magazine, and three barracks were constructed. Masonry sides and rear walls were built, and the fort was enclosed by a moat. During this reconstruction the fort was garrisoned by one or two companies of U.S. Artillery, but this contingent was withdrawn in 1849 at the close of the hostilities with Mexico. From time to time a detachment was sent from Savannah to do maintenance and repair work. During most of the Civil War, Fort Jackson was occupied by Confederate troops. It was evacuated only when General William T. Sherman's forces occupied Savannah in December 1864.[39]

Fort Clinch on the northern point of Amelia Island was the result of an act of Congress of 8 August 1846 that appropriated $20,000 "for the commencement of a fort at the entrance to Cumberland Sound, Georgia."[40] However, problems with land titles delayed construction until 1851.[41] Colonel James Louis Mason directed the initial work, but in May 1853 it was put under the charge of Lieutenant Gilmer in Savannah. Construction continued under Gilmer until August 1857, and then was assumed by Lieutenant Whiting.[42]



*An excellent view of the interior casemate construction at Fort Clinch, Amelia Island, Florida. Notice the embrasures in the walls. (Fort Clinch State Park, Florida)*

Fort Clinch was designed as a Third System masonry fortification with outer walls that were eight feet thick. The fort included casemated gun emplacements, officers' quarters, a magazine, and barracks. As was typical of Third System forts, provision was made for a bastion at all five corners of the pentagon.[43] Most of the work was completed by 1861, just in time for the fort to be occupied

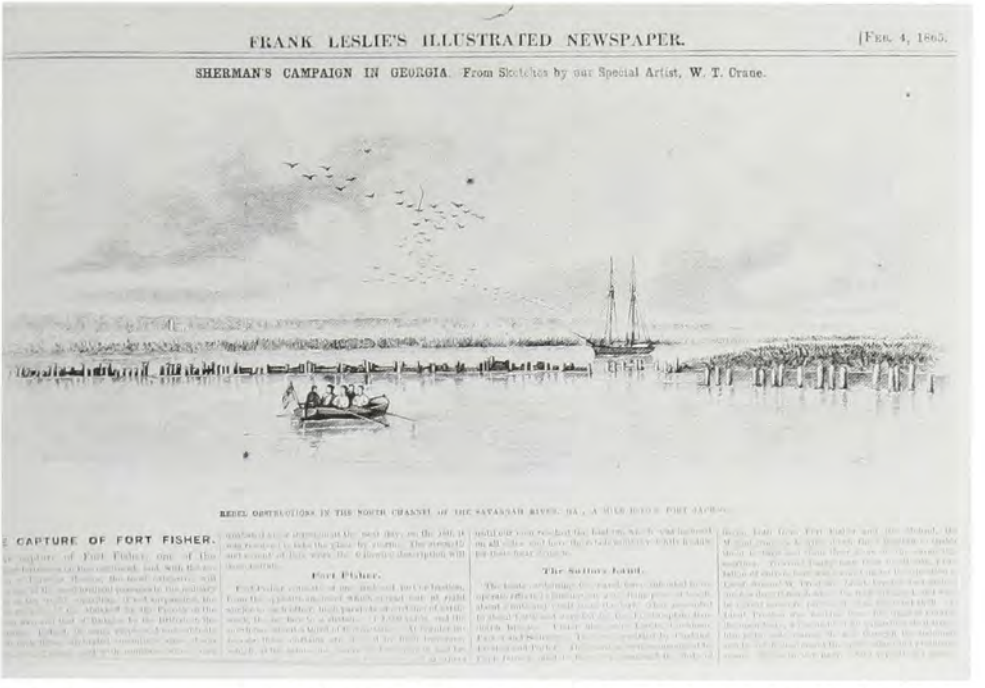


*Aerial view of Fort Clinch, Florida, taken about 1970. (Fort Clinch State Park, Florida)*

by insurgent Confederate forces from Florida. In January of that year, Whiting had suspended operations at the site in anticipation of its occupation and his own resignation from Engineer service.[44] In 1862, on receiving news of the approach of Union ships, the Confederate troops left Fort Clinch and destroyed the railroad bridge over the inland waterway. From then on the fort was a federal possession.

## THE CIVIL WAR INTERLUDE

Obviously, no construction was carried on in the Savannah area during the Civil War years. Indeed, much of the progress that had been made in river and harbor improvements and in building fortifications was not only interrupted but was reversed because of the war. The excellent 1853 survey of the Savannah River from Augusta to Savannah, and its proposal for improving navigation, was set aside and had to be repeated after the war. The benefits from the project for improving navigation in the lower Savannah River from the city to the mouth, which had been completed in 1860, were negated during the war when the South sank obstructions in the channel as a defensive measure. In general, navigation on the Savannah River in 1865 was in the same deplorable condition it had been in before 1830 despite tremendous investments of effort and money prior to the Civil War.


FRANK LESLIE'S ILLUSTRATED NEWSPAPER. [Feb. 4, 1865.

SHERMAN'S CAMPAIGN IN GEORGIA. From Sketches by our Special Artist, W. T. Crane.

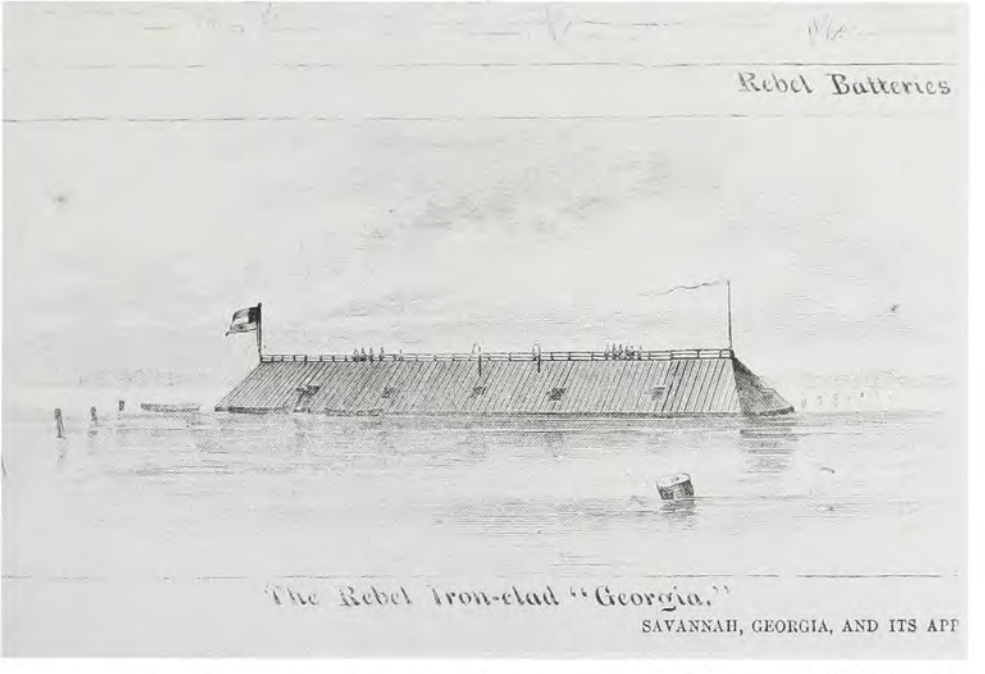
REBEL OBSTRUCTIONS IN THE SOUTH CHANNEL OF THE SAVANNAH RIVER, GA., A MILE BELOW FORT JACKSON.

CAPTURE OF FORT FISHER.

Fort Fisher.

The Sailors Land.

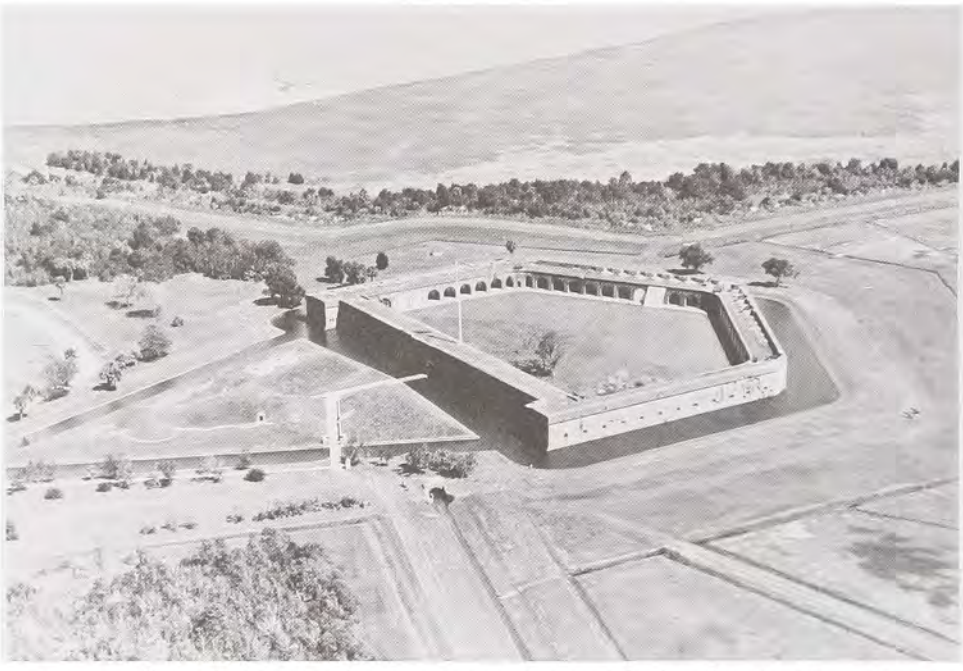
*Drawing from Frank Leslie's Illustrated Newspaper of February 4, 1865 showing the pilings and obstructions placed in the channel of the Savannah River by the Confederate authorities to prevent an invasion of the city of Savannah. (Coastal Heritage Society)*


Rebel Batteries

The Rebel Iron-clad "Georgia."

SAVANNAH, GEORGIA, AND ITS APP

*Drawing of the rebel ironclad,* Georgia *which appeared in the February 14, 1863 issue of* Harper's Weekly. *This vessel was later sunk in the river to further obstruct the channel. (Coastal Heritage Society)*



*Aerial view of Fort Pulaski showing the moat, the drainage ditch and the demilune. (Georgia Historical Society, n.d.)*



*An example of the casemated interior of Fort Pulaski, 1935-1936. The inverted vault structure below the floor level served as a cistern for the storage of rainwater. (Library of Congress)*

Perhaps the most devastating blow inflicted by the Civil War on the Savannah works, however, was the destruction of Fort Pulaski in 1862. At completion, this Fort was regarded as an outstanding example of the Nation's new system of coastal defenses. The Fort was considered impregnable. One Confederate authority stated, "You might as well cannonade the Rocky Mountains as Fort Pulaski." After inspecting the fort in November 1861, Robert E. Lee noted the distance from the fort to Tybee Island and remarked to Colonel Charles Olmstead, the fort's commander, that if federal batteries were placed on Tybee beach, "they will make it very warm for you with shells from that point, but they cannot breach from that distance!"[45] From 800 to 900 yards was at that time considered the optimum range from which a solid masonry wall could be attacked with any success. Prior to the siege of Fort Pulaski, however, no fortification had ever been subjected to rifle fire. In the year following Lee's remark to Olmstead, Fort Sumter in Charleston Harbor was reduced to ruins at a distance of two to three miles.

While the Confederates were bringing cannon and munitions to Cockspur Island in the fall of 1861, a large federal Army and Navy force was moving southward by sea, capturing and blockading ports along the Atlantic Coast. From a base on Hilton Head Island, South Carolina, about 15 miles from Cockspur, the federal batteries of the new rifled cannon, together with regular cannon, were set up early in 1862 on Tybee Island and the marshlands opposite the fort. These guns were located in 11 different batteries stretching for 2.5 miles. Four of these batteries were armed with ten-inch rifled guns firing Parrott and James projectiles.[46]

Early on the morning of 10 April 1862, when the federal forces were all in



*A close-up view of the damage inflicted on Fort Pulaski by rifled artillery, 1862. (Georgia Historical Society)*

position, the Union commander Major General David Hunter sent a communication to Colonel Olmstead demanding the unconditional surrender of Fort Pulaski. Colonel Olmstead promptly replied, "I am here to defend the Fort, not to surrender it."[47] The Federals immediately began a 35-hour bombardment during which the southeastern angle and wall of the fort were breached, threatening the magazine on the opposite interior wall. Colonel Olmstead surrendered at about two o'clock in the afternoon of 11 April. The supposedly impregnable fortress had fallen, and with it were captured 385 officers and men, 48 cannon, and a large quantity of supplies.



*Gun emplacements on the upper tier of the northeast flank of Fort Pulaski in 1862 after the fort was occupied by Federal forces. The North Channel of the Savannah River can be seen in the background. (Georgia Historical Society)*

The immediate result was that Savannah, one of the principal seaports in the South, was cut off from all foreign trade. Because federal troops never relinquished the Fort, it became part of the coastal blockade that eventually was to throttle the economic life of the entire South. Its casemates also served as a military and political prison in 1864 and 1865. The siege of Fort Pulaski, moreover, was a landmark in military history. The breaching of the Fort's massive brick walls by projectiles from rifled cannon demonstrated for the first time that brick and masonry fortifications could not withstand the fire of modern guns. That the power of rifled artillery was unknown to the Federals themselves is shown by the statement of General Quincy Gillmore of the U.S. Army Corps of Engineers:

> "Had we possessed our present knowledge of their power, previous to the bombardment of Fort Pulaski, the eight weeks of laborious preparation for its reduction, could have been curtailed to one week, as heavy Mortars and Columbiads would have been omitted from the armament of the batteries as unsuitable for breaching at long range."[48]

The fall of Fort Pulaski marked the beginning of great advances in modern artillery and a major change in the philosophy of coastal defense in the Nation.

# 3 THE MIDDLE PERIOD, 1865 TO 1940

The Gilded Age, 1865 to 1900, was an era of enormous change as the Nation evolved into a modern, complex society with growing worldwide influence. The value of American manufacturing rose from $3 billion in the 1860s to $65 billion in 1900. The population more than doubled. In 1860 one-sixth of the Nation lived in cities; this figure increased to one-third by the end of the century. The world's finest railroad network included 242,000 miles of tracks tying the Nation together as never before.

As the country came to depend largely on the railroads, water transportation declined in the post-Civil War years. The eminent American historians Samuel Eliot Morison and Henry Steele Commager noted that railroads were "looked upon as an unmixed blessing" and their promoters "were regarded as public benefactors."[1] Nevertheless, navigation improvements in rivers and harbors during the late 19th century were far more common than is generally believed. As one citizen commented, "This era, as in other directions, marks a new departure in river and harbor improvement, and to this date *[1886]*, may properly be assigned the beginning of a policy, which has since steadily expanded to its present position."[2]

Railroads expanded during the era due to governmental support at all levels in the form of loans, land grants, and tax exemptions. At the same time, Congress voted ever-increasing amounts of money for river and harbor work and enlarged the number and size of projects receiving this money. In 1866, for example, Congress appropriated $3,881,000 for projects, while in 1890, 436 projects were funded in the amount of $25,136,300. The $91,227,600 sum voted for the 1880s was more than the total appropriations for the previous 60 years.[3] One explanation for the improvements in water transportation was that they were viewed as a solution to the notorious abuses of the railroad monopolies. Also, the expanding trade of an industrial society demanded improved harbor facilities for local, national, and overseas commerce.

Unlike the railroads that were built by private companies using public financial assistance, waterways development was carried out by the Army Corps of Engineers. Aided by Supreme Court decisions, by the late decades of the century, Congress had established its authority over America's waterways. That authority was delegated through the Secretary of War and the Army to the Corps of Engineers.

In terms of river and harbor work, improvement in navigation was the central concern throughout this era and into the first decades of the 20th century. Every ton of dredged sand or rock and every log dragged from the bottom of a river or pulled from its banks was evaluated in terms of its improving the navigational potential of the waterway or harbor. Gradually the measures defined as navigation improvements increased, and the powers and responsibilities of the Corps of Engineers were broadened to include establishing harbor lines and regulating navigable waters and harbors. These duties were related to control over potential encroachments upon navigation, such as construction of dams, bridges, levees, and piers, as well as to pollution of these waters. The Corps assumed a permanent regulatory role involving the issuance or denial of permits to individuals and companies seeking to build such structures on or across navigable waters. However, the Corps' paramount mission was to improve waterways for navigation purposes, and the Engineers tied their recommendations to that criteria. This role tended to limit the full expansion of Corps work until the post-World War II era.



*The U.S. snagboat* Ocmulgee *in operation, a typical scene on Georgia rivers under the responsibility of the Savannah District of the Corps of Engineers in the late 19th and early 20th centuries. n.d. (Savannah District, Corps of Engineers, from an original glass negative)*

The long-standing lack of vision in waterways development was accompanied by an absence of overall, integrated planning. In the last years of the 1800s and early decades of the next century, projects were carried out as if they were devoid of any relationship to other projects nearby. Harbor projects were handled separately from improvements to the rivers that flowed into these

harbors. Tributaries were treated independently of the main rivers. For a long time, dredging in coastal waters and marshes was done without any concept of each individual project's being a part of a greater system.

Congress was responsible for these conditions, for it had — and still has — the sole power to authorize surveys and projects and to appropriate funds. William Stull Holt in his history of the Corps of Engineers wrote that:

> "The power of deciding the question of whether a place is worth improving has not been used by the Corps of Engineers to formulate a national policy or general program for the construction of public works, as that has been regarded as the duty of Congress. Nor has Congress ever directed the Corps of Engineers to make such a program. So it [the Corps] looked upon itself merely as an executing agent to carry out orders given to it regardless of whether such orders were wise or not."[4]

A recent study of the role of the Corps of Engineers in river development reiterated that up to the 1920s, "the Federal Government could become involved in river development only for navigation improvement," and this attitude set the pattern for the Corps. The author added, "Only projects that could be brought under the head of improvements for transportation received congressional attention."[5] Another observer complained that Congress authorized many projects, "but the work was prosecuted in an irregular and haphazard manner over a long period of years."[6]

In spite of such claims, however, the Corps, as the agency to examine, survey, and recommend projects, could have been a leader rather than always a follower in defining projects. This situation was due in large part to the problem of




*The steamboat* Altamaha *made the Savannah-Augusta run on the Savannah River. n.d. (Richmond County Historical Society)*



*A spur dam on the Savannah River below Augusta in 1924. This type of construction was used by the Corps of Engineers in the early 20th century for contraction of river channels and protection of river banks. (Savannah District, Corps of Engineers)*

responding to demands. Congress heard the appeals of such local interests and referred the proposed projects to the Corps of Engineers for examination, recommendation, and execution — as appropriate — according to congressional authorization and funding. Likewise, the expansion of the Corps' role and responsibilities had to come through congressional action, and "political and economic pressures and peculiar national circumstances would have to press Congress to ultimately adopt the multipurpose planning concept and broaden the authorized jurisdiction of the Corps."[7]

During the first two decades of the 20th century, the Engineers' civil construction continued to focus primarily in navigation improvements. Moreover, prior to 1920, Congress continued to authorize many projects of only local significance. Gradually, however, the national lawmakers and thus the Corps became aware of the need to integrate projects. The changing technology of the shipping industry was one factor responsible for this. As ships became bigger, larger harbors and deeper rivers were needed. Many of the older, small projects were dropped, and the Engineers concentrated on the major works. In other cases, small projects were combined into one large project. The Board of Engineers for Rivers and Harbors, created in 1902 to review all river and harbor projects, came to play an important role in this reduction and integration process, but final authority for such Corps actions and decisions still came from Congress.

While the economic prosperity of the 1920s contributed to the Corps' attention to major river and harbor activities, the Engineers also were being required to give more attention to flood control. As a result of increasingly damaging floods on the Mississippi River, Congress enacted the Flood Control Act of 1917 giving the U.S. Government, through the Corps, limited responsibility for flood control work in the Mississippi Valley. Congress also called on the Army Engineers to address flood problems on other specified rivers across the Nation. In 1925 Congress directed the Corps to submit cost estimates for surveys of certain navigable streams selected by the Corps for navigation improvement and to include data on water power development, irrigation potential, and flood control. The resulting report was submitted to Congress as House Document 308, 69th Congress, 1st session. In 1927 the national lawmakers authorized the Corps to survey those rivers the Engineers had recommended, and added a few others to the list. The resulting reports became the "308 reports" that laid the foundation for later Corps activities in such river basins as that of the Savannah River.

The economic crisis of the 1930s precipitated Franklin D. Roosevelt's New Deal, a program that greatly expanded the role of the Federal Government. As a consequence, the Corps of Engineers' construction activities increased. Flood control received more attention during the decade, and a 1935 law authorized the Engineers to supplement the 308 studies. Of major significance was the 1936 Flood Control Act, where for the first time the Federal Government



*The U.S. pipeline dredge* Morgan *in operation in May 1921. (Savannah District, Corps of Engineers)*

assumed responsibility for a general flood control policy on nonnavigable waters. That same law required the application of economic analysis — the benefit-cost ratio — to flood control projects, a criteria later applied to all water resource projects. In addition, the Corps proved to be an effective national planning and construction agency for implementing many of the New Deal "pump-priming" projects created to relieve unemployment and restore prosperity. Not only was the Corps able to start numerous long-delayed projects, but many of its officers found themselves in high places in the civilian administration, where they were called on to share their knowledge and planning experience. Several of the Corps river and harbor projects benefited from financial assistance through New Deal agencies such as the Public Works Administration. World War II, of course, brought a temporary halt to most of the Corps' civil projects.

In the years between the Civil War and World War II, the Savannah District at first contracted out most of its work on river and harbor projects to private companies, although day laborers working with government-owned plant were also used. By the 1920s, however, the situation had reversed. According to one Corps authority, by 1924 the Corps was using hired labor and government plant 75 percent of the time as opposed to only 12 percent in 1900. Accordingly, the value of the Government equipment was estimated to be $50 million in 1924, but only $2.5 million in 1900.[8] The operations of the Savannah District reflected that trend and, increasingly up until World War II, the majority of its civil work was done by hired labor.

One of the byproducts of the American Industrial Revolution was a naval expansion program beginning in the early 1880s that produced a powerful, all-steel navy ranking third in the world by 1900. This rapid naval buildup helped spur the United States toward imperialism, making it a legitimate rival to European powers. At the same time, Americans began to recognize that the country's coastal defenses were lacking. If the U.S. Navy were not to be relegated to defending its own shores, the situation had to be rectified.

The great masonry forts built in the 19th century had proven vulnerable to the rifled cannon fire of the Civil War; a new approach was needed. According to the Corps of Engineers, the coasts of the United States in the late 1880s "were undefended, except by obsolete ordnance mounted in old-style masonry forts entirely incapable of coping with ships protected by armor and armed with powerful breech-loaded cannon, such as had been uniformly adopted for the fleets of the world."[9] In 1885 Congress created the Board of Fortifications and Other Defenses under Secretary of War William C. Endicott to review the situation and make recommendations.

The Endicott board, as it came to be called, proposed in its report of 16 January 1886 a series of new defenses for 27 major harbors. These plans called for detached batteries of earthworks protected by steel-plated masonry. The earthworks would hold high-powered guns and mortars. A mine network set in the respective harbors would provide additional protection. In 1888 Congress established the Board of Ordnance and Fortification, headed by Major General John M. Shofield, to implement these recommendations. Two years later the first funds for construction of batteries were appropriated. These batteries came to replace the earlier large masonry forts.



*Camp Barker, a Spanish-American War encampment on the southern end of St. Simons Island at the entrance to Brunswick Harbor as seen from the top of the St. Simons Lighthouse in 1898. (Coastal Georgia Historical Society)*

The Corps' military and defense activities waned somewhat after the Civil War, particularly when compared to the pre-1865 era. However, the Corps officers serving in coastal areas had charge of constructing the defense works resulting from the recommendations of the Endicott board and thus returned to the military side of the Corps' purpose. The Spanish-American War brought a sense of urgency to these activities, especially along the Atlantic and Gulf seaboards. Operations undertaken at that time were continued or expanded in the next few years, and World War I reinforced the Corps' military role in coastal defense. However, the post-1919 years brought a decline in the Corps' military responsibilities as the Quartermaster Corps, another military construction branch of the Army, assumed most of the Army's construction activity. Only the coming of World War II would restore the Corps of Engineers' military construction role to its former level.

The growing number of projects and responsibilities of the Corps of Engineers, both civil and military, in the post-Civil War era called for the Corps' reorganization. By the end of the 19th century, the now familiar concept of Divisions and Districts, with well-defined geographical boundaries, took shape. These changes were reflected in the organization and definition of the Savannah District.

In the earlier decades of the century, the term "Savannah Station" had been used to designate the officers and headquarters of the Corps responsible for military and civil projects in Savannah and coastal Georgia as well as in parts of northern Florida. At times the term also referred to the territory assigned to the

various officers. Then, in 1869 Colonel Quincy A. Gillmore became the Superintending Engineer of the Coast Defenses from Cape Fear River, North Carolina, to St. Augustine, Florida. The following year his responsibilities were expanded to include civil works in North and South Carolina, Georgia, and eastern Florida. Although Gillmore retained his residence in New York, he periodically inspected the various activities under his command. The many separate and independent projects for navigation improvement and military construction were the responsibility of the Engineers who served as Gillmore's assistants. In the early 1880s, for example, Sewall L. Fremont, an 1841 graduate of West Point, was Assistant Engineer in charge of the Savannah River and reported on various other Georgia coastal projects as well; W.G. Williamson was Assistant Engineer over the Altamaha River activity; and Lieutenant W.L. Fisk was Assistant Engineer responsible for work in Cumberland Sound. All of these areas soon would be included in the Savannah District.[10]

In 1885 Lieutenant Oberlin M. Carter became the Assistant Engineer responsible for improvements in the lower Savannah and the Altamaha rivers. By then, the area that Gillmore supervised included only coastal South Carolina and Georgia and the northeast coast of Florida. In 1886 this territory was subdivided, with Lieutenant Frederic V. Abbot being given charge of local work in coastal South Carolina and Carter becoming local officer in charge of all projects in coastal Georgia, including Cumberland Sound. The Assistant Engineers now reported to Abbot or Carter, who in turn reported to Gillmore. The death of Colonel Gillmore on 7 April 1888 brought further organizational changes. Colonel Henry L. Abbot briefly assumed Gillmore's duties until Lieutenant Frederic V. Abbot and Lieutenant Carter were made the Officers in Charge of their respective areas, each submitting separate reports for the 1888 *Annual Report*.

Carter was responsible for coastal fortifications and navigational works for the eastern half of Georgia as well as for Cumberland Sound on the Georgia-Florida boundary. These projects included coastal fortifications such as Forts Pulaski, Oglethorpe (formerly Jackson), Screven, and Clinch and any improvements along the Savannah River; Savannah Harbor; the Oconee, Ocmulgee, and Altamaha system; the Satilla River; the Inside Passage (later the Intracoastal Waterway); the harbors at Darien and Brunswick, Georgia; and Cumberland Sound. At the same time, Colonel William P. Craighill was made Supervising Engineer for coastal projects from Maryland to the Gulf Coast of Florida. Carter, Abbot, and four other Corps Engineers reported to him.[11]

The Savannah District traces its origins to the date when Colonel Abbot was relieved by Carter. Therefore, records list Carter as the first Savannah District Engineer. The term "District" was used for the first time as an official designation in the *Annual Report* of 1893, previously being used only in a general way. Until 1893 Carter was known simply as the "Officer in Charge," and he submitted his reports from the "United States Engineer Office, Savannah, Georgia." The territorial definition of the District, of course, was determined by the projects Carter supervised at that time. Meanwhile, a regulation approved by the Secretary of War in February 1889 consolidated the work of the Corps of Engineers into five Divisions, with each Division being supervised by an Engineer officer.[12] Colonel Craighill became responsible for the new Southeastern



*Quincy A. Gillmore supervised the work of the Corps of Engineers between 1869 and 1888 in the area that became the Savannah District. (The United States Military Academy Archives)*

Division. He served as Division Engineer until 1895, when he was replaced by Colonel Peter C. Hains. Carter and the territory under his command were included in this new Southeastern Division.

The two men who between 1869 and 1898 supervised the Corps' work in what later became the Savannah District were both extremely competent although different as to backgrounds. Quincy Gillmore was a well-respected Corps officer who had graduated first in his class at the Military Academy in 1849. He had been an instructor at West Point prior to the Civil War but achieved his claim to fame during that conflict because of his successful schemes to reduce Fort Pulaski in 1862 and Fort Sumter one year later. Gillmore, therefore, was a product of the pre-Civil War and the Civil War eras of military and engineering technology. Although he received a Ph.D. degree from Rutgers in 1878 and wrote many publications, his expertise was in the characteristics and uses of concrete and stone. Hence, he was a masonry expert in an emerging era of steel and hydrology.[13]

Oberlin M. Carter, on the other hand, had graduated from West Point after the Civil War, in 1880, also first in his class. After his assignment to the Savannah office in 1885, he wrote numerous letters to Washington requesting



*Oberlin M. Carter, the first formal District Engineer in the Savannah District, commanded the District between 1888 and 1897. (The United States Military Academy Archives)*

the loan of specific engineering books from the engineering library.[14] His interest in professional development and desire to improve his expertise were reflected in the sophisticated and detailed reports that he submitted. The reports attested to the thorough examinations and surveys he had conducted in the rivers and harbors under his supervision.[15] As the first Savannah District Engineer, Carter set standards for thoroughness that were to be perpetuated by later generations of Savannah Engineers. His studies formed the basis for many improvement projects that continued well into the 20th century, and often his conclusions and recommendations were far ahead of his time.[16]

Carter was well liked by his employees and associates during his 13 years in the Savannah area. He was also popular among civic groups and counted some of the city's most prominent citizens among his friends.[17] Hence, the community was shocked when accusations were brought against him in 1897 by his successor, Captain Cassius E. Gillette. These accusations involved charges of fraud and corruption in connection with a government contract that he had administered for work being done in Savannah Harbor and Cumberland Sound. Carter, who following his tenure in Savannah was appointed by President William McKinley to be military attaché in London and a member of the Isthmian Canal Commission to locate a canal route across Central America,





## Cassius Erie Gillette

WAS born, December 19, 1859, in Jasper, Steuben County, N. Y., which patriotic surroundings deriving their titles from Sergeant Jasper and Baron Steuben, gave him an early taste for picks and shovels and other appliances used by army engineers.

He attended public schools and the State Normal at Mansfield, Pa., being graduated in 1879.

The Hon. John L. Mitchell was responsible for sending him to West Point, where he loomed up on the same date as most of those heretofore noted, June, 1880.

He stuck to A Company, rooming with Wren, Sturgis and Knight, and was a Corporal, 1st Sergeant and Captain.

He was assigned to the Engineers and became a Major in 1903, resigning in February, 1906, to become Chief Engineer of the Bureau of Filtration, Philadelphia, Pennsylvania. Since April, 1907, he has been a Consulting Hydraulic and Mining Engineer.

He served on Boards to plan improvements at the Dallas Rapids and mouth of Columbia River. He wrote a paper on "Sea Coast Harbors", published in *Transactions of the American Society of Civil Engineers*, in 1904, and was a member of the California *Débris* Commission, 1893 to 1897. He helped some in the present plan of the Panama Canal.

During the Spanish War he was on duty keeping some contractors from running off with the coast of Georgia.

The most important event in his history was his marriage, August 21, 1889, to Miss Annie Hamilton. They have one son and two daughters.

2d Lieutenant Corps of Engineers, June 15, 1884; 1st Lieutenant Corps of Engineers, 1887; Captain Corps of Engineers, 1896; Major Corps of Engineers, 1903. Resigned February 28, 1906.

*Cassius E. Gillette, Savannah District Engineer between 1897 and 1903. (The United States Military Academy Archives)*

was brought back to Savannah and tried by general court-martial He was found guilty "of misappropriation of funds, of bad work, of corrupt practices in letting contracts and gross irregularities in other matters."[18] Although he spent five years in Leavenworth Prison, Carter and his supporters continued to insist on his innocence and the lack of validity of the circumstantial evidence used to

convict him.[19] Even today, local citizens and Corps employees are divided on the issue.

Captain Gillette supervised the Savannah District office from 1898 to 1903. He continued the maintenance work connected with the river and harbor projects, although he did not always agree with the recommendations of his predecessor.[20] In his 1899 *Annual Report* he included a map showing the boundaries of the Savannah District.[21] The map shows the boundaries as essentially the same as the modern civil works boundaries. These extended along the Georgia coast from Tybee Bar at the mouth of the Savannah River south to the mouth of the St. Marys River and included all the river systems flowing into the Atlantic Ocean along that portion of the coast. These rivers (the Savannah, the Altamaha, the Oconee, the Ocmulgee, the Ogeechee, the Satilla, and the St. Marys) from their headwaters to their mouths and their tributaries were included in the Savannah District along with the coastal harbors, bars, inland passages, and sounds. The projects for navigational improvement continued to determine the definition of the District boundaries.



*The Southern Bank Building formerly located on the southwest corner of Drayton and Bryan Streets in Savannah housed the Savannah District Office between 1888 and 1900. (Georgia Historical Society)*

From 1888 to 1900 the District office was housed in the Southern Bank Building on the southwest corner of Drayton and Bryan streets in Savannah, the current site of the Citizens and Southern Bank. In 1900 the office was moved to the newly constructed Post Office Building at the corner of Bull and State streets, where it remained until the early 1950s.[22] Carter and his immediate successors did not need much space because until the early 1900s the staff generally included only the District Engineer and two or three clerks. The actual surveys and examinations were done by Assistant Engineers under the



*The old Savannah Post Office and Federal Building, seen here in the 1920s and located at the corner of Bull and State Streets, was the home of the Savannah District Office from 1900 to 1952. (Georgia Historical Society)*

supervision of the District Engineer, some of them operating out of sub-offices such as the one in Fernandina in the 1890s. When Congress approved projects and appropriated funds, the Corps either hired day laborers to work using government vessels or contracted the work to private companies.[23]

By the end of the 19th century, the Corps' increased civil works activity necessitated increasing the number of commissioned officers. At that time the Corps included 126 commissioned officers serving in five Divisions, each made up of Districts.[24] Congress increased the Corps to 160 officers in February 1901, and by the next year the number of Divisions had grown to nine. Of the 160 officers, however, only 27 were available for construction work in all the engineering Districts; the rest were involved in activities other than river and harbor work or construction of fortifications.[25] This fact necessitated some reorganization. During the first two decades of the 20th century, several of the District officers in the Savannah District also held the position of Division Engineer for the Southeast Division. Savannah thus was not only District headquarters but Division headquarters as well. The Southeast Division territory changed over the years, but at one time it extended from Norfolk, Virginia, down to Key West, Florida. Later it included only the Districts of Charleston, Jacksonville, and Montgomery as well as that of Savannah.

The Savannah District Engineer's dual role began with Lieutenant Colonel James B. Quinn, who became Division Engineer on 31 March 1903 and a little more than a month later took over the Savannah District from Captain Gillette. Lieutenant Colonel Dan C. Kingman assumed the twofold responsibility in 1906, followed by Colonel William C. Langfitt in 1914, Colonel John Millis in 1916, and Colonel Frederick W. Altstaetter in 1918. As these were extremely




*Map of the United States Engineer Department, Southeast Division, 13 June 1921.The Division included the Savannah, Charleston, Jacksonville, and Montgomery Districts, and the Division headquarters were located in Savannah at the time. (adaptation of original map, Savannah District, Corps of Engineers)*

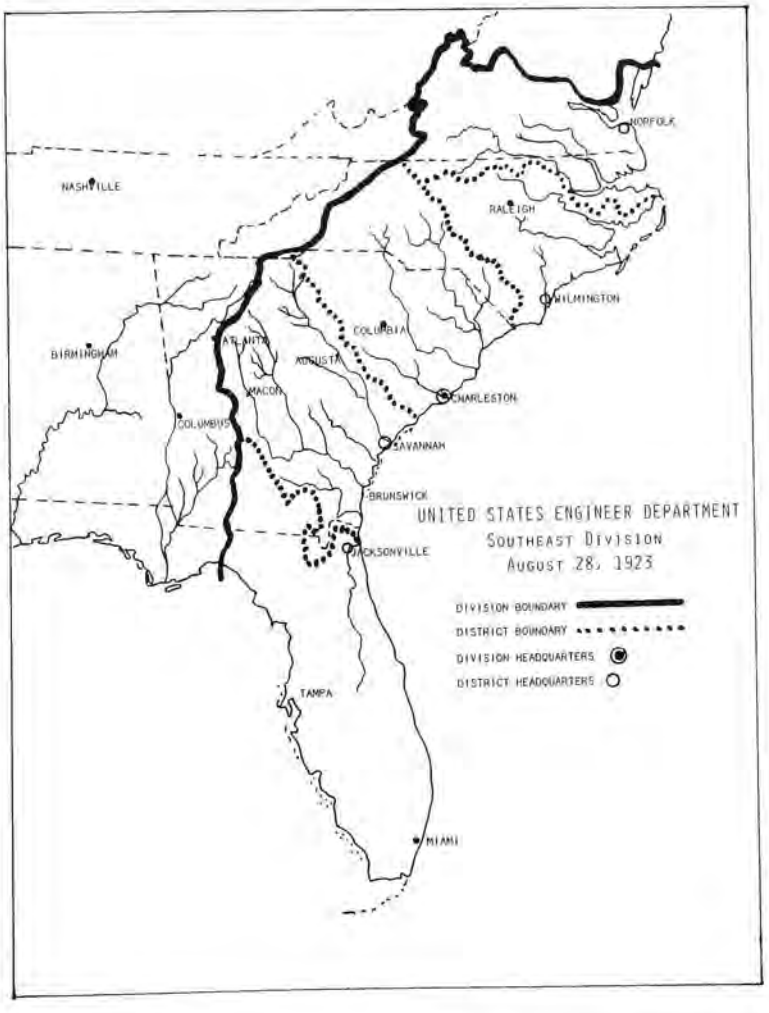
busy years for the Savannah District, the five men shouldered a major burden of the Corps' activity. Kingman noted the extra work required of him when in 1913 he requested the appointment of a new Assistant Engineer in Savannah. He complained that the obligations of the Division Engineer's office frequently denied him the time and attention he needed to give the District.[26]

Of the five officers, only Lieutenant Colonel Quinn held both jobs during his full tenure as District Engineer. However, the Division headquarters remained in Savannah, which especially pleased the people of that city. They felt that having the Division Engineer reside in the Savannah District, particularly when the same man served in both positions, predisposed the Division commander toward their District's projects. This explains the opposition in Savannah when moving the Division headquarters to Charleston was proposed in 1922.

Colonel Spencer Cosby, Division Engineer, wrote the Chief of Engineers in the summer of 1922 commenting on the "intense feeling of rivalry and jealousy" that existed among the four major south Atlantic ports of Charleston, Savannah, Brunswick, and Jacksonville. He added, "I have an idea that the [Savannah] Board of Trade here fears that if the Division Engineer lives in Charleston he will be apt to be biased in favor of that port, more accessible to arguments that are favorable to it."[27] Savannah's Mayor Murray M. Stewart reflected this rivalry when he wrote, "We feel that it is a blow to the prestige of

this city and port to have these headquarters transferred to Charleston, a port whose commercial rank is so far below that of Savannah.''[28]

Ironically, the Savannians' claims of the superiority of their port and the importance of other Savannah District projects supported rather than argued against transfer of the Division office to Charleston. Using figures contained in the 1922 congressional allotment for river and harbor works in the recently redefined Southeast Division, the Savannah Board of Trade cited the fact that the appropriations included $910,000 for Norfolk, Virginia; $257,800 for Wilmington, North Carolina; $944,500 for Jacksonville, Florida; and a mere $38,000 for Charleston, South Carolina. The Savannah District, on the other hand, was to receive $1,252,200.[29]




*Map of the United States Engineer Department, Southeast Division, 28 August 1923. The Division at this time included the Savannah, Charleston, Jacksonville, Wilmington, and Norfolk Districts, and Division headquarters had been moved to Charleston. (adaptation of original map, Savannah District, Corps of Engineers)*

The Chief of Engineers acknowledged the Savannah District's concerns. However, he noted that the limited number of Engineer officers available under current legislation required that the offices of the Division Engineer and the District Engineer again be consolidated and that the Savannah District office could not handle both jobs because of the very facts presented by the Savannah Board of Trade. "The large amount of work in the Savannah District," he wrote, "requires the uninterrupted attention of the District Engineer, and it is not felt that it would be just to the interests of the locality to place further duties on the District Engineer at Savannah. At Charleston, on the contrary, the work is so much less that one officer can perform both duties." Moreover, the Southeast Division was being reorganized to include the Norfolk, Wilmington, Charleston, Savannah, and Jacksonville Districts, and Charleston was considered to be better located to serve as the new Southeast Division's headquarters.[30] Accordingly, the Southeast Division headquarters was moved to Charleston.

The area of the Savannah District actually changed little between 1900 and World War II except to be extended a little farther north or south from time to time. For example, Fernandina Harbor, Florida, was added to the District in 1907. Also, as the Intracoastal Waterway was developed, the Savannah Engineers became responsible for a larger section than had been the case in earlier years. By 1932 the District had charge of the waterway from the Coosaw River nine miles north of Beaufort, South Carolina, to the St. Johns River near Jacksonville, Florida. This assignment was temporary, however. Within a few years the Savannah office was responsible for only the length from Beaufort to



*The Savannah District's inspection yacht* Isondega, *pictured in 1922 along the harbor front in Savannah, was used for inspection of the work done along the Intracoastal Waterway. (Savannah District, Corps of Engineers)*

Cumberland Sound. During this same period, the District also reached up into South Carolina to include the Beaufort and Broad River basins. While the territorial boundaries of the Savannah District changed little during these years, the office's activities expanded to make it one of the outstanding Corps of Engineers Districts in the South.

Notable among those who served as District Engineer in the Savannah District before World War II were Lieutenant Colonel James B. Quinn, Colonel Dan Kingman, Colonel Frederick W. Altstaetter, Major Dan I. Sultan, and Major Douglas L. Weart. As already noted, Lieutenant Colonel Quinn served as both Savannah District Engineer and Division Engineer in the Southeast Division from 1903 to 1906. An 1866 graduate of West Point, he came to




*James B. Quinn, Savannah District Engineer and Southeast Division Engineer between 1903 and 1906. (National Archives)*

Savannah with extensive experience in river and harbor work in the Midwest and Mississippi River Valley as well as along the Virginia and North Carolina coasts. He was well liked in Savannah, for when his tenure was up, the Savannah Chamber of Commerce petitioned Secretary of War William Howard Taft to keep Quinn at his post, citing not only the quality of his work but the fact that his "unfailing courtesy and conduct of his office" had endeared him to the people of Savannah. Taft denied the request, however.[31]

Dan Kingman also served as Division Engineer in the Southeast Division during part of his service in the Savannah District. While in Savannah he also



*Dan C. Kingman, Savannah District Engineer from 1906 to 1913. (The United States Military Academy Archives)*

was temporarily in charge of defensive works on the South Carolina coast and river and harbor improvements in the Charleston District. He also served as a member of the Board of Engineers for Rivers and Harbors. An 1875 graduate of West Point, he too came to Savannah with a notable background in river and harbor work. He had been in charge of improvements in New Orleans and of levee construction and repair on the lower Mississippi River and Red River, harbor work on Lake Ontario and Lake Erie, and improvements on the Tennessee and Cumberland rivers. Colonel Kingman served in the Savannah District until 9 October 1913, when he was promoted to Brigadier General and appointed Chief of Engineers. He held that position until retiring from the Army in March 1916.[32]

Colonel Altstaetter, a member of the 1897 class at West Point, served in the Philippines early in his career and was captured by Filipino insurgents during their resistance to American rule in 1900. He taught engineering at West Point from 1902 to 1906 and later was Director of Civil Engineering at the Army Engineer School at Washington Barracks in 1914. Altstaetter served as District Engineer in several Districts before coming to Savannah. As previously noted, for part of his appointment he served as both Southeast Division Engineer and Savannah's District Engineer. Although he retired from the Army on disability in August 1920, he continued as District Engineer until the fall of 1923. Subsequently, he established a consulting engineer firm in Savannah and was active in the business, cultural, and social life of that city for many years.[33] In the tense



*Frederick W. Altstaetter, Savannah District Engineer from 1918 to 1923 and again from 1940 to 1941. (Savannah District, Corps of Engineers)*



*Dan I. Sultan, Savannah District Engineer between 1923 and 1925. (The United States Military Academy Archives)*

atmosphere prior to U.S. involvement in World War II, Altstaetter came out of retirement from November 1940 to December 1941 to fill once more the job of District Engineer.

Major Dan Sultan was District Engineer in Savannah for less than two years. Prior to his service there, he had commanded the Engineer troops in the Philippine Islands who were constructing the fortifications at Corregidor in 1916 and 1917. During World War II he was the first deputy commander in chief of the China-Burma-India theater of war under Joseph W. Stilwell. He later was commander of the India-Burma theater. In 1945 he was named Inspector General of the Army, a position he held until his death in 1947.[34] Major



*Douglas L. Weart, Savannah District Engineer between 1928 and 1932. (Savannah District, Corps of Engineers)*

Douglas L. Weart, on the other hand, was an authority on river management and harbor construction. In serving as District Engineer in the Savannah District from 1928 to 1932, he played an important role in the harbor improvement projects of the District and in the early flood control studies and planning of that era. His last post before retirement from the Army in 1951 was as commander of The Engineer Center at Fort Belvoir, Virginia.[35]

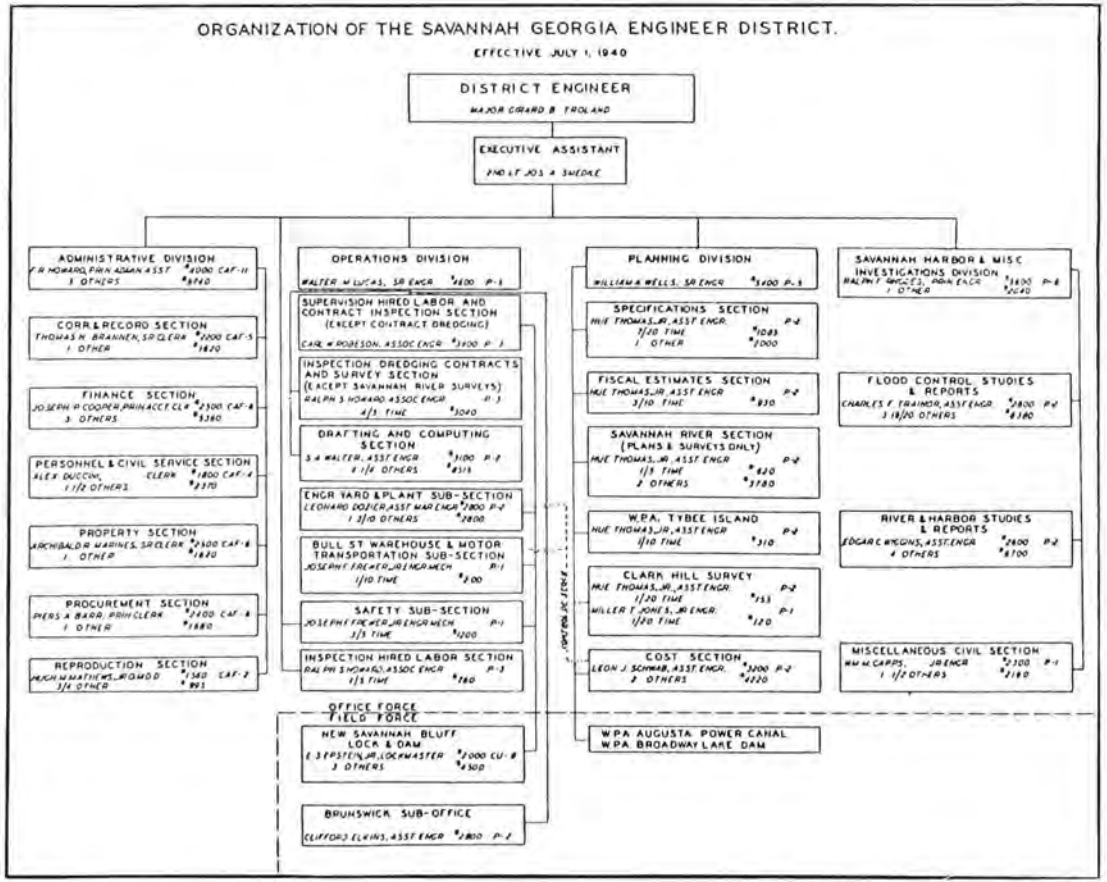
In the early 20th century, the staff of the District office began to grow as Corps responsibilities in both number and size of projects expanded. Civil engineers, clerks, and a secretary were added. By the time of U.S. involvement in World War I, the three Divisions in the District office were the Clerical Division, which included eight people with Fred R. Howard as chief clerk; the River and Harbor Division, which handled all civil works and employed five



*District Engineer Raymond F. Fowler, second from left on the front row, and staff in late 1930s. Ralph F. Rhodes is the first person seated on the left of the front row, and Walter M. Lucas is the fourth person from the left on the front row. Charles F. Trainor is the first person on the left of the third row. (Graner,* History of the Savannah District, *p. 25)*

people under the leadership of the senior Assistant Engineer William C. Lemen; and the Defense Division, which dealt with military affairs and defenses and had a work force of four including Perry J. Shearhouse, the ranking junior Engineer. Three sub-offices were located at Brunswick, Augusta, and Fort Screven on Tybee Island, each with an Assistant Engineer.

By the end of the Depression decade, more than 40 men and women were working at the District office. In 1940 the four main divisions were the Administrative Division, the Operations Division, the Planning Division, and the Savannah Harbor and Miscellaneous Investigations Division. Each division, moreover, included various numbers of sub-divisions. During these years of growth, some of the civil engineers whose names are associated closely with the Savannah District office were Charles G. Bochman, who joined in 1905, followed by Ralph F. Rhodes, Walter M. Lucas, and Charles F. Trainor. Bochman and other civilian engineers working with him formed the nucleus of what eventually became the Operations Division, while Rhodes helped establish what was to become the Engineering Division. District Engineers would come and go, but the increasing number of civilian engineers provided continuity and "played a vital role in organizing the strong civilian support to the District Engineer which lasted to the beginning of World War II."[36]




*Organization chart of the Savannah District as of July 1940 showing the four main division and their respective sub-divisions. (Savannah District, Corps of Engineers)*

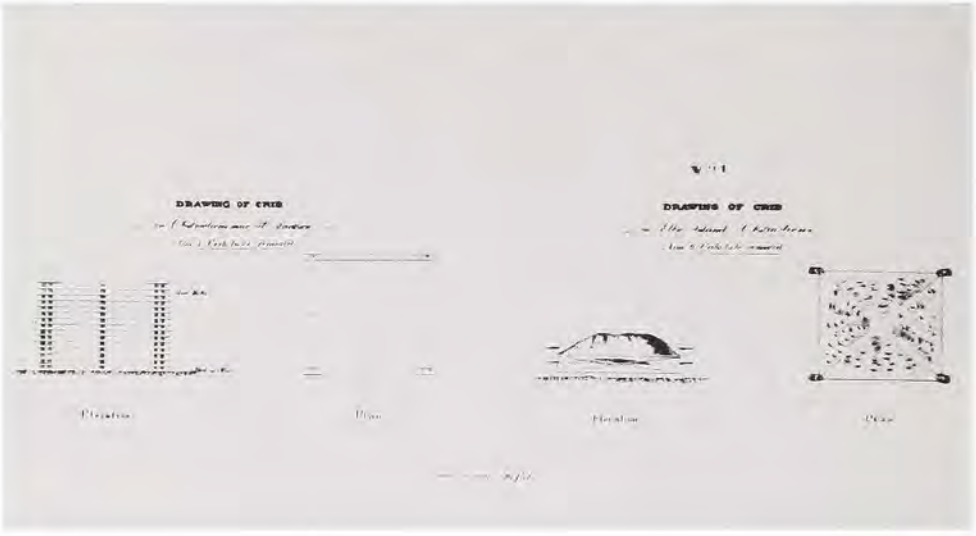
# 4 SAVANNAH HARBOR

## SAVANNAH HARBOR PROJECT

Savannah Harbor has long been one of the major ports in the South, and the harbor's reputation is linked closely to the historical significance of the city of Savannah. As a result, the harbor has ranked as the primary civil project of the Savannah District. Along with such other port cities as Charleston and New Orleans, Savannah became a center of trade and commerce serving a wide geographical area in the 18th and 19th centuries. Railroads made the city a major stop, if not in fact a terminus, for their lines. Recognizing these facts, the U.S. Government early designated the port as a principal candidate for river and harbor improvements.

Ironically, the harbor's importance cannot be tied to its natural features. Actually, Savannah Harbor is no more than the lower 21 miles of the Savannah River. This river rises in the Blue Ridge Mountains of North Carolina and is formed by the confluence of the Tugaloo and Seneca Rivers. It is approximately 315 miles long and throughout most of its course forms the boundary between Georgia and South Carolina. The river is a major silt carrier, and shoaling always has posed a major problem for the harbor at the mouth of the river. Moreover, this part of the river is actually an estuary and thus is subject to tidal currents and the effects of a major sandbar located a few miles out to sea. Typical of so many rivers in coastal Georgia and South Carolina, in its original condition the Savannah River contained numerous islands in its lower reaches that divided it into various shallow channels and branches. Hence, the harbor lacked an effective natural scour to maintain a deep, stable channel. The harbor's natural state, coupled with the demand for continued improvement, has always been a major challenge in terms of development and maintenance.

During the Civil War, the Confederacy attempted to hinder the navigability of the river and harbor below Savannah in order to protect the city from the Union forces. Obstructions such as abandoned vessels, piles, iron-shod snags, torpedoes, logs, and timber cribs loaded with brick and stone were sunk at various points.[1] In 1861 two large ships and one smaller one were sunk near Fort Pulaski. They were still interfering with passage in the channel as of 1873.[2] Later in the war, cribs loaded with paving stones, bricks, and live oak were sunk at the head of Elba Island. Just below these cribs, 60 vessels were sunk in the channel, and this point came to be known as "the Obstructions." The South




*Drawings of cribs which were constructed as obstructions in the Savannah River near Fort Jackson and Elba Island during the Civil War. These had to be removed following the war. (Savannah District, Corps of Engineers)*

Channel was closed at its upper end in the same manner. Two other cribs were sunk in the river and used as a mooring for the ironclad vessel *Georgia*. This ship, armored with 500 tons of railroad iron, was stationed in the river to prevent the passage of enemy vessels up the channel. In 1864 it was scuttled and sunk when Savannah was evacuated. Wrecks were also sunk near Fig Island, and the ironclad ram *Ogeechee* was sunk in the Front River directly opposite the City Exchange. These obstructions dramatically increased shoaling and thus reduced the high-water depth of the channel from 17.5 feet, its depth before the war, to 13.5 feet. After the capture of Savannah in 1865, the Quartermaster Corps removed three cribs and one vessel from the location known as the Obstructions, and the U.S. Navy made a smaller opening in the South Channel.[3]

In 1866 Henry S. Welles, under contracts with the U.S. Treasury Department, began removing the wrecks, cribs, and other obstructions in the river. Welles removed 20 vessels, 40 cribs, 150 piles, and a number of iron-shod snags and torpedoes. By an act of Congress of 27 February 1874, he was paid $193,132.96 for this work.[4] Savannah assumed charge of the improvement projects in 1867. The city dredged a channel 18 feet deep at mean high water through the Wrecks and began a channel at the Obstructions. In 1868 dredging was done at Marsh Island and at a point of the Georgia shore opposite Kings Island. In 1869 dredging again was done at the Wrecks. At the same time, the channel north of the Oyster Bed Shoal, then 9.5 feet at mean low water, was deepened.

In 1870 the Wrecks channel was deepened enough to admit a ship drawing 17.5 feet of water, but the channel was very crooked and continued to shoal. The Garden Bank Shoal was dredged three times, and the channel there was widened temporarily from 120 feet to 150 feet. The shoal opposite the foot of West Broad Street also was dredged that year. In 1871 an opening was dredged

north of Marsh Island, and the channel at the Wrecks was reopened. From the close of the war until 1872, Savannah spent approximately $157,000 for dredgeboats, scows, steamboat tugs, labor, and supervision.[5] From 1865 to 1875, 60 timber cribs; 26 wrecked vessels; 200 piles; plus logs, torpedoes, and other obstacles were removed from the river (mostly by Welles). A torpedo was removed from the channel as late as 1886.[6] In 1872 the U.S. Engineer Department resumed charge of improving the river and harbor. Through congressional appropriations for 1872 and 1873, the Engineers removed 6 vessels, 16 cribs, and 1 sunken lighter from the channel, and dredged at various points between the city and the mouth of the river.



*Late 19th century view of Savannah Harbor looking east toward Fort Jackson from the cupola of the old City Exchange. (Coastal Heritage Society)*

In 1873 Major Quincy A. Gillmore, the Engineer in charge of the coastal work in South Carolina, Georgia, and northern Florida, submitted plans for a project to establish a channel from Tybee Roads to Savannah, usable at high tides for vessels drawing 22 feet of water. This plan formed the basis of the work done to improve Savannah Harbor for the next two decades.

As previously stated, the Savannah River is a major silt carrier, particularly during the rainy season. This silting condition caused numerous bars and islands to form in the broader portions of the river where the current is less rapid. At a point about three miles above Savannah, the stream is divided by Hutchinson's Island (later spelled Hutchinsons) into two channels that unite again at the lower end of Fig Island, about 1 mile below the city and 5.1 miles from the point of separation. The southern branch of this separation flows along the city front and is called Front River. The branch north of Hutchinson's Island next to the South Carolina shore is called Back River, and the stream

connecting the two at the head of Hutchinson's Island is known as "the Cross Tides."

At the time, the Back River waterway was larger than that of the Front River. Consequently, it carried a greater volume of water. Its natural channel was not only wider and deeper, but it was also shorter than that of Front River. Gillmore observed that almost two-thirds of the water flowing down the Savannah River passed through the Cross Tides into Back River. Moreover, he noted that the Cross Tides channel itself was larger than Back River and had an ebb current 1.5 times swifter than the ebb current in Back River.[7] As a result, the primary problem involved in using the river as a harbor and port for Savannah was to maintain an adequate depth and width for Front River and the channel to a point beyond Fig Island. The man-made obstructions, of course, increased the flow of water in Back River and thus helped to deepen its channel. Gillmore concluded that the problem could be solved by constructing a dam at the Cross Tides to divert some of the water normally flowing into the Back River into the Front River.[8]

This plan had been proposed as early as the mid-1830s, but was abandoned because of opposition raised by South Carolina. Citizens there feared that altering the flow of the current along that side of the river would be detrimental to their navigation interests. Gillmore's plan sought to neutralize that opposition, for it attempted to accommodate the small boats that used the Back River channel to reach the plantations on the South Carolina shore. Gillmore proposed keeping the Cross Tides dam 5 or 6 feet below ordinary high-water levels at its midpoint for a distance of 50 or 60 feet. A dam constructed according to these specifications, Gillmore felt, would afford an ample channel for the small craft such as canoes, rowboats, scows, and sailboats that were accustomed to passing through the Cross Tides.[9]

The second feature of Gillmore's proposal for improving the harbor facilities was to widen the river in front of the city. His idea was to cut away some points on the Hutchinson Island side of the river that were projecting into the channel. By removing these points and curving the bulkhead along the altered shoreline, the river could be increased to 575 feet in width where it passed the city.[10]

Finally, the 1873 plan called for various measures to ensure a channel of 15 feet at low water (22 feet at high water). These measures included dredging, straightening the channel at the Wrecks, maintaining a swift water flow through the channel at the Obstructions, and improving the channel south of the Oyster Bed and across the Knoll just north of Fort Pulaski. This latter decision was made based on defensive considerations even though the channel north of the Oyster Bed had been the one earlier selected and improved by the city of Savannah. Gillmore contended that it could be "much better protected by the proposed armament of Fort Pulaski, or, indeed, by an armament that could be placed on Cockspur Island, than the north passage."[11]

In recommending this plan of improvement, Gillmore was aware of the extent to which it impinged on certain private property in the Savannah area. However, he felt that the needs of the "central Government" outweighed the rights of private ownership. He acknowledged that the points of land on Hutchinson Island that he recommended removing were located "in conformity to, or under the authority of, a law enacted by the legislature of the State of Georgia more

than thirty years ago," but added that those projections were "beyond question, formidable obstructions in a navigable tidal water of the United States" and should be removed without expense to the federal government.[12] In another instance, Gillmore discovered that on the south side of the narrow channel at the Garden Banks, the Atlantic and Gulf Railroad Company had constructed an artificial wharf that extended 60 feet from the shore into deep water. (Apparently, the wharf was built to avoid the expense of dredging.) Gillmore recommended that "this obstruction should be removed without delay, at the expense of the company, or the requisite legal steps taken to accomplish that result."[13] Such views anticipated the day when the Corps of Engineers would have power over setting and enforcing harbor lines.

Gillmore's 1873 plan of improvement for the Savannah River was submitted to a Board of Engineers which recommended its adoption. Work began in fiscal year 1875. The initial work consisted of dredging at the Garden Bank, the Wrecks, the Upper Flats in the North Channel, and at Tybee Knoll. Two cribs were removed from the South Channel and one wreck from near the Atlantic and Gulf Railroad wharves in the Front River. Some work also was done at the Obstructions. In 1876 a decision was made to abandon the tortuous and crooked channel at the Wrecks and to open a new, straight channel along the south shore of the river. The river also was widened and deepened between Kings and Hutchinson's Islands, and dredging was done at various points between the Cross Tides and the ocean. In February 1876, the closing at the Cross Tides was begun. The dam was to be composed of pilings that extended across the stream, with an opening left in the middle deep enough to allow small boats to pass. South Carolina again objected to the construction of this dam, and on 13 May 1876 the work was suspended in compliance with a temporary injunction granted by the U.S. Supreme Court. After the injunction was removed, work resumed in March of 1877.

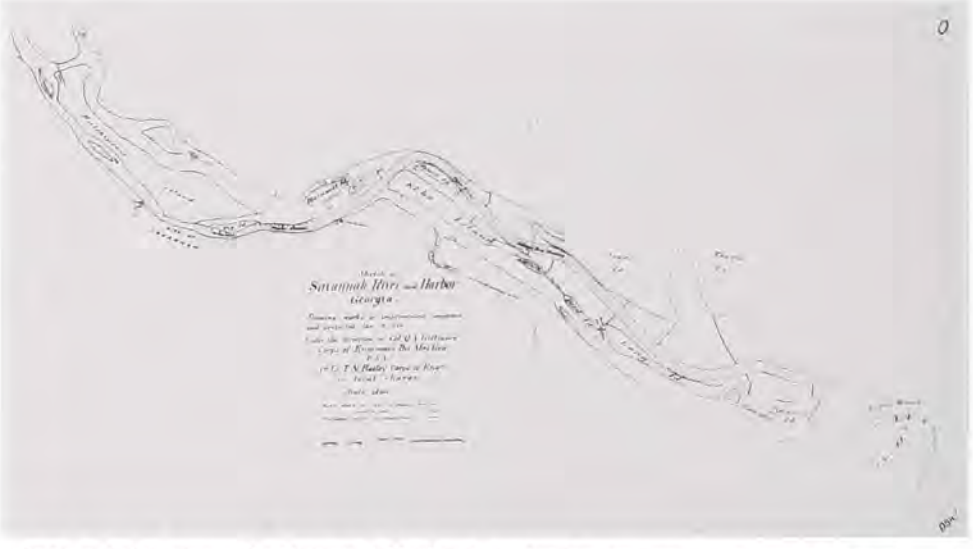


*View looking east of Savannah Harbor and the city of Savannah printed in* Harper's Weekly, *17 November 1883. The old City Exchange can be seen in the upper left center section of the picture. (Coastal Heritage Society)*

By the end of the 1870s, the Corps focused more attention on the river below the city, where islands again divided it into the North Channel and South Channel. In March 1879 a supplementary plan was submitted to the Engineer Department, which provided for improving the North Channel of the Savannah River in preference to the South Channel from the head of Elba Island to the head of Cockspur Island.[14] This plan proposed closing the lateral openings between the islands from Elba to Cockspur by means of dams, thus contracting the opening into the South Channel. The result would be the diversion of a large volume of water into the North Channel, which would thereafter be used as the main channel for ships entering the harbor. This proposal also provided for shore protection at various points along the river and for continued dredging of the channel. By the end of fiscal year 1881, work had progressed to the extent that the channel from Tybee Roads to Savannah would accommodate vessels that drew 13 feet at low water and 19 feet at high water.[15]

The dam at the Cross Tides had been completed up to the mean low-water line in accordance with the original 1873 plan of improvement, and marked changes were beginning to be noticed in the riverbed. For instance, according to an 1874 survey there was an average depth of 8 feet and a maximum depth of 16 feet at low tide on a line 60 feet below the side of the dam; in May 1881 the average depth on the same line had increased to 15 feet, with a maximum depth of 36.5 feet. However, eddies produced by currents below the dam were also scooping the riverbed and impinging on the shoreline of Argyle Island. To arrest further erosion, a decision was made to raise the dam and to protect the shore with brush mattresses covered with riprap. In the same year the foundation of the dam across the South Channel was completed, and a portion of the second course of this dam was laid.[16]

On 3 March 1881 Congress directed the officer in charge of the work in



*Sketch of the Savannah River and Harbor showing the improvements completed through 1883 and future works projected for the river. Notice the design of the channel location and the wing dams, the training walls, and the jetties which were intended to maintain the channel. (Savannah District, Corps of Engineers)*

Savannah to make a survey and cost estimate for further improvements needed in the Savannah River and Harbor "to increase the depth of the water in said river and harbor from the bar up to the city to 22 feet and an estimate of the cost of widening the channel of the Savannah River opposite the city to 600 feet of uniform depth with the balance of the channel."[17] Gillmore submitted a report in January 1882 that retained all the principal features of the two preceding proposals, but provided for a number of works designed to enlarge the scope of the improvements.

Between 1882 and 1888 the work in the Savannah Harbor progressed according to this revised plan:

- The dam at the Cross Tides was raised 5 feet above mean low water by adding brush mattresses and riprap.
- Wing dams were built at Garden Bank to reduce the width of the waterway.
- A training wall with a crest 5 feet above mean low water was built from the lower end of Fig Island 6,000 feet eastward.
- Closing dams were constructed between the islands from Elba to Cockspur and between the Barnwell Islands.
- Wing dams were built at the Upper and Lower Flats.
- A dam designed to improve the channel northwest of Fort Pulaski was built at the mouth of the river extending for approximately 1,600 feet from a point near the Oyster Bed Beacon toward Turtle Island.

All of the dams in the river were built of log mattresses approximately 15 inches thick, covered with 4 to 9 inches of brush and loaded with stone. The periodic repairs to these dams generally consisted of filling holes with brush fascines loaded with riprap, or adding to their top portions to offset the dams' settling and sinking (a recurring problem at the Cross Tides dam). In addition to this construction and repair work, dredging continued in the channel from the city to Tybee Roads. At that time the Corps usually contracted out all construction and much of the dredging to private companies such as the American Dredging Company of Philadelphia and the Savannah Dredging Company. But because contractors did not always fulfill their obligations, more and more of the dredging was to be done by hired labor working in government vessels such as the *Henry Burden*.

In August 1886 Congress passed a rivers and harbors bill that provided for an examination of Savannah Harbor from the Cross Tides to the bar to determine the cost of establishing a channel 28 feet deep at mean high water.[18] Colonel Gillmore reported that the harbor improvement had progressed to the point that vessels drawing from 20 to 21 feet could move from the city to the bar. He further indicated that the 22-foot depth could be achieved with no additional costs, particularly since the depth of the channel at the bar was naturally established at about 22 feet due to the effects of currents and tides. A channel 28 feet deep, on the other hand, would require spending additional sums of money needed to finance deepening the channel across the bar and additional dredging and constrictive works required to achieve and maintain the greater depth from the city to the bar. Thus, as Gillmore assessed the situation, "The question appears to be simply this, whether Savannah Harbor is of sufficient importance to warrant the outlay of a large sum of money..." In advocating the improvements, Gillmore stated that the additional depth would significantly




*View of Savannah Harbor looking west up the harbor to the western limits of the harbor project, 1883. (Georgia Historical Society)*

increase the commerce of "the most important port of the United States on the South Atlantic coast.... If it should be found practicable to obtain permanently a depth of 28 feet in the river and on the bar, Savannah would not only gain vastly in commercial aspects, but would also serve as a convenient harbor of refuge for a large number of vessels."[19]

Colonel Gillmore directed Lieutenant Oberlin M. Carter, Assistant Engineer in charge of the Savannah work, to conduct an extensive survey of the harbor and river. Carter submitted his report on 30 June 1890. The survey included information on the tides at various locations, velocity and volume measurements in the main channel, and sophisticated hydrographic analyses. Colonel William P. Craighill, who had become Division Engineer, presented the report to the Office of the Chief of Engineers. It was referred to as "the best yet done for this river."[20] Still, no action was taken on the report because of the large expenditures required for the 28-foot depth. The Chief of Engineers, Brigadier General Thomas L. Casey, did recognize the need for a deeper harbor, however. He urged that the project be amended to provide for a 26-foot depth at high water, and requested that Lieutenant Carter prepare a cost estimate.[21]

For the next few years, Carter's revised project was followed in developing the Savannah River and Harbor. The project was based on the 1890 survey results that indicated the need for a mean ebb velocity of approximately 2 feet per second to maintain a permanent river channel. The project involved molding the riverbed from the Cross Tides to the sea to allow the free ascent of the flood tide and to secure the maximum uniform mean velocity of the ebb tide. The plan included channel dredging above the Cross Tides, removing parts of Kings and Marsh islands to increase the volume of water flowing into the Front River, constructing training walls and other constricting or deflecting devices at various points along the harbor to direct the flow of water through the river

channel, and dredging from the city to the ocean as required to secure the 26-foot depth.[22]

Carter stressed that "future operations should be carried on simultaneously throughout the whole extent of the river, and to secure successful and permanent results, dredging should be accompanied or promptly followed by contracting works." In an appeal for adequate funding, he noted that "the insufficient and irregular appropriations of the past have rendered satisfactory progress impossible, and have increased the cost of the work in some instances as much as 100 percent."[23] In these two statements Carter addressed two of the biggest problems in the efficient execution of river and harbor projects at that time — piecemeal work that often resulted in deterioration of one part of a project before another was finished and insufficient appropriations to finance the complete work at any one time.

Carter's appeal met with success, and within six years he was reporting that the amount appropriated in response to the 1890 cost extimate had been spent. He further reported that the work on contraction of the channel had been completed and a navigable channel 26 feet deep at mean high water from the city to the ocean had been established. The project, however, had been less successful than anticipated because of the makeup of the riverbed, which during the periods of ebb flow prevented the expected amount of scouring. The river, therefore, failed to make up in depth what it had lost in width. This decrease in the size of the riverbed in turn decreased the volume of the tidal flow.

Ernst A. Gieseler, Assistant Engineer in Savannah, declared that the harbor probably would never be self-maintaining because of the large volume of sediment brought down the river. He predicted that dredging would be needed regularly in Savannah Harbor.[24] Gieseler's observations proved to be accurate. A Board of Engineers' report of 26 September 1898 further stated that while the channel depth had been greatly improved, this had been accomplished only through extensive dredging "such as must always form an essential part of the improvement of tidal silt-bearing rivers." The report went on to state that the existing dikes and training walls had proven to be so well situated that no changes were necessary. However, "a great deal more of dredging should yet be done before the present method of improvement at this place can be considered as fairly tested or as completed."[25]

In the 1894 Rivers and Harbors Act, Congress instructed the Secretary of War to submit a report as to whether the works then under way in Savannah would afford safe anchorage for vessels lying in Tybee Roads. If such safe anchorage could not be provided by the project as modified in 1890, the Engineer in Charge was to report on any changes needed in the construction and to include cost estimates.[26] Consequently, Lieutenant Carter prepared a report on a modified plan of improvement for Savannah Harbor. The project as submitted in 1887 had contemplated the construction of works to shelter the anchorage at Tybee Roads and to improve the channel across the outer bar. That plan was modified in 1890 to provide for improvement only as far seaward as Tybee Roads. Therefore, the 1890 modified plan provided for no work toward sheltering the anchorage. The two training walls extending eastward from Oyster Bed

and Cockspur islands were to be carried only far enough to cross at Tybee Knoll.

The anchorage at Tybee Roads was fully exposed to the destructive storms blowing in from the east and northeast. Carter's 1894 report concluded that additional works would not only afford a safe anchorage for vessels in Tybee Roads, but would be of great value in developing and maintaining the channels across the Knoll and the ocean bar. He recommended building an 800-foot detached extension of the Oyster Bed training wall so that it would run parallel to the normal currents along the axis of the sand shoal separating Tybee Roads and Calibogue Sound to the north. Doing this, he said, should provide a safe anchorage for 200 ships, each 300 feet long.[27] The Savannah Board of Trade endorsed his plan and in turn appealed to the senators and representatives from Georgia to support enabling legislation.[28] Congress approved Carter's recommendations, and the plan thus modified was funded under the Rivers and Harbors Act of 1896.[29]

In the Emergency Rivers and Harbors Act of 1900, Congress called on the Corps of Engineers to make a preliminary survey of the Savannah Harbor to determine if it should be deepened to 28 feet mean high water (22 feet at mean low water). This depth had been proposed in 1886 and reported on in the Chief of Engineers' *Annual Report* of 1888, but the plan had never been adopted. After District Engineer Cassius E. Gillette responded favorably in his report on the preliminary study, a special board of engineer officers was appointed to review the 1888 project and to recommend any necessary changes or modifications.

Noting Savannah's potential for increased commerce, the board recommended enlarging the harbor to a depth of 28 feet mean high water and to widths varying from 350 to 500 feet from the old waterworks two miles above the city down to the ocean. The board advocated dredging as the primary means



*Scene at the cotton docks in Savannah Harbor in the early 20th century. (Georgia Historical Society)*

of improvement to be done by government plant or by contract. However, it took a dim view of all the training walls built in the harbor during the previous decade, charging that they restricted the tidal flow in the harbor and thus the natural scour through the channel. Therefore, the board proposed that no work be done to raise the height of these structures until after the dredging was completed to expand the tidal flow. Moreover, the board opposed building jetties at the entrance of the harbor, a common practice in harbors along the southeast coast. The board felt that it would be costly and unnecessary to improve the bar, which was one of the most stable throughout the region. Finally, the board proposed that mooring dolphins be constructed at two locations, the Bight and Venus Point, to facilitate the passing of ships inside the harbor. Congress adopted this project as recommended in June 1902.[30]



*View of the lumber docks at Savannah Harbor. n.d. (Georgia Historical Society)*

Over the next few years the project was supervised by the Savannah District office. The Corps contracted most of the dredging in the river itself to companies such as P. Sanford Ross (Incorporated); George T. Warner; and the Atlantic, Gulf and Pacific Company. At the same time, the Corps used government dredges such as the *Cape Fear,* the *Cumberland,* and the newly acquired *Savannah* for work at the mouth of the river and on Tybee Knoll and the outer bar. Even as the project progressed, shoaling on Tybee Knoll and at "critical" points inside the harbor such as the Obstructions, Upper and Lower Flats, and Long Island Crossing required maintenance dredging to restore specified depths. Construction of the two mooring dolphins and repairs to and raising of the training walls completed in 1906 were also carried out under contracts negotiated by the Savannah District office.

During this period of project development, the Corps began to use a technique called "agitation dredging," which took advantage of the tidal flow to facilitate removal of dredged materials. Normally, the dredges filled their hoppers, which were then dumped at sea. However, in 1906 the dredges began pumping the materials overboard. Because they remained suspended for a long time, the ebb tide carried them out to sea. This process demonstrated that the tidal currents could be used as a valuable natural aid to expanding and maintaining Savannah Harbor.[31]

As the 1902 project was being carried out by the Savannah District and its contractors, the Rivers and Harbors Act of 1905 required the Army Engineers to make yet another survey of Savannah Harbor. This examination was to determine the feasibility of a harbor 26 feet deep at mean low water, or 4 feet deeper than called for in the current project. Lieutenant Colonel James B. Quinn, Savannah District officer, was charged with this assignment. His report recommended securing the new depth through dredging but also called for further contraction works in the river such as additional jetties and spur dams and the raising of existing training walls and dikes.[32]

In accordance with the provisions of the 1902 law, the three-man Board of Engineers for Rivers and Harbors reviewed the project. The Engineer officers questioned whether the depth of 26 feet at mean low water could be achieved and maintained across the bar by dredging and without the costly construction of jetties. This opinion contradicted that of the earlier Board of Engineers in 1900. Moreover while noting the desirability of the deeper harbor, the board questioned whether it could be achieved at a reasonable cost. In light of such questions, the board recommended to Congress that "the work be undertaken in a tentative manner with the view of ascertaining how deep a channel, up to the limit of 26 feet at mean low water, could be secured and maintained upon the ocean bar...." The depth on the bar was, in fact, the critical issue, because the value of deepening the harbor itself was contingent upon the maximum depth there.[33]

In heeding the concerns of the Board of Engineers for Rivers and Harbors, in 1907 Congress adopted a limited and experimental new project for Savannah Harbor. The law provided for first dredging a 21-foot channel across the bar and then gradually deepening it "until the limit fixed by economy of maintenance is reached." It also authorized raising and extending dikes, jetties, and other river contractions at a cost not to exceed $300,000, as well as the purchase of a stationary-type pumping dredge for the District. Gradually, the depth at the bar was to be extended up the harbor.[34]

The Corps' operations related to the 1902 project dovetailed with those called for by the new law; the dredging and training wall work completed were applied to the new project. Over the next two years little was done to increase the depth of the river itself. Instead, maintenance dredging was carried on to preserve the 28-foot mean high-water depth, especially at the critical points of Upper and Lower Flats and Long Island Crossing, where shoaling was a constant problem due to the crossing of the current from one bank of the river to the other. Work to strengthen and raise the existing training walls in these areas also continued. Colonel Dan Kingman, District Engineer at the time, explained that the increased height of the training walls was necessary to prevent water from

spilling over them during ebb tide and thus to accelerate the tidal flow that in turn helped reduce silt deposits.[35] As usual, this part of the project was done by contractors such as the Roderick G. Rose Company of Jacksonville, which began raising and strengthening the North Long Island and Cockspur Island training walls. The Corps' primary task under the 1907 act related to the outside harbor at the bar, Tybee Roads, Tybee Knoll, and the mouth of the river near the Quarantine Station, where the government's seagoing dredges *Savannah* and *Cumberland* were dredging.

Colonel Kingman reviewed the results of the project thus far and wrote, "I think it may be stated with confidence that a channel 26 feet in depth across Tybee bar can be secured and maintained at a moderate cost." He asserted that his greater concern was whether a 26-foot depth could be maintained in the river itself due to the large amount of silt carried by the current and the resultant shoaling. He cautioned that the training walls would need much more work than was predicted in the 1905 survey.[36] The Chief of Engineers echoed Kingman's support for a deeper Savannah Harbor.



*Steamboats at dock in Savannah Harbor including* Pilot Boy *c. 1911. (Georgia Historical Society)*

Congress adopted the 26-foot project in the Rivers and Harbors Act of 1910, setting 30 June 1914 as its completion date.[37] The Savannah District office carried out the new project, which primarily involved dredging by government-owned dredges using hired labor, although some contract work was done. The training walls, which had been the focus of so much activity in previous years, received little attention. Maintenance dredging was a constant need. As the project was approaching its target completion date in the summer of 1914, the

District Engineer noted that shoaling already had "materially decreased the project depth in various places throughout the harbor."[38]

As the importance of Savannah Harbor grew over the years, Congress always recognized the need for its continued expansion. Reflecting the continued national enthusiasm for river and harbor development, Congress directed the Corps to do a preliminary examination of extending the harbor two miles farther up the river. Colonel Kingman's report recommended excavating a channel 21 feet deep at mean low water and 300 feet wide from the upper limits of the present harbor to the foot of Kings Island. He asserted that the land below Savannah was marshy and soft and, accordingly, not suitable for factory or business sites. He proposed that the harbor be extended farther upriver where the land was better suited to industrial development. The Board of Engineers for Rivers and Harbors at first disagreed with Kingman, saying that the improvement would not be of sufficient benefit to warrant its costs. However, the board later yielded to the views of the District Engineer, and Congress approved this extension in the Rivers and Harbors Act of 1912.[39]

The Savannah District carried out the revised project by dredging both under contract and by using such government plant as the seagoing dredge *Cumberland* and the pipeline dredge *Morgan*. During this time, shoaling continued to be a problem throughout the harbor. In 1914 the District Engineer noted that 3,046,800 cubic yards of materials had to be removed from the harbor to restore it to full depth and width, but the "combined yearly capacity of the Government fleet of dredges is [only] about 3 million yards."[40] Two years later it was reported that all dredging was for maintenance work only and not for the



*The U.S. pipeline dredge* Morgan *was used by the Savannah District in early 20th century efforts to enlarge and maintain authorized dimensions in Savannah Harbor. n.d. (Savannah District, Corps of Engineers)*

advancement of the project. Moreover, at that time only 67 percent of the approved 26-foot channel had a navigable depth of 26 feet or more, as compared with 87.3 percent of the channel the previous year.[41]

These maintenance problems set the project's schedule for completion back considerably. However, more was at stake here than merely harbor depths and cubic yards of silt. The public image of the Army Engineers in Savannah suffered, particularly that of Colonel John Millis, District Engineer between 1916 and 1918. Over the years the various District officers generally had the respect and support of the people of Savannah. Any criticism of the Corps usually came from people in other parts of the District who accused the District Engineer of favoring Savannah. Colonel Kingman was particularly well liked during his seven-year tenure because of his staunch support for improving the harbor, a position that at times saw him in open disagreement with his superior officers. In a very different atmosphere, Colonel Millis, in 1918, was thrust into a confrontation with the harbor proponents in Savannah.

The initial issue was the shoaling in the harbor. Millis's critics included Wallace J. Pierpont, mayor of Savannah; Henry S. Colding, president of the Marine Engineers' Beneficial Association; J.F. Minis, chairman of the Commissioners of Pilotage, Savannah; William B. Stillwell, chairman of the Savannah Harbor Commission; Georgia T. Cann, president of the Savannah Board of Trade; and Hoke Smith, senator from Georgia. They accused Millis of neglect in handling the harbor improvements, which they claimed had in turn allowed the shoaling to become excessive. Playing the politician's role, Senator Smith wrote, "I regret to say...that the conservative citizens of that steady and non-excitable community have become thoroughly satisfied of the inefficiency of Colonel Millis and that their harbor is being seriously injured as a result of his inefficiency."[42]

These Savannah leaders complained that appropriated money went unused and government dredges sat idle while harbor conditions degenerated to the point of jeopardizing the ships using the harbor and thus the commercial potential of the port. Through Senator Smith, they convinced the Chief of Engineers to require an investigation of the work in the harbor and the office of the District Engineer, and some called for Millis's dismissal.[43] Millis answered his critics by claiming that, overall, the harbor channel had improved during his time in the District and that as a whole the harbor was "in a very materially better condition" than when he assumed his duties two years earlier. While conceding that work was not progressing as desired, he blamed this on America's involvement in World War I: "the great scarcity of men due to the draft and the unusual demands and high salaries paid at the shipyards, and other local industries, and the very meager facilities at Savannah for respairs [*sic*] and upkeep of the dredges and other plant."[44]

As the conflict intensified, the charges degenerated into slander and mudslinging. Mr. Colding, President of the Savannah Marine Engineers' Beneficial Association, charged that Millis had created deplorable working conditions among the civilian engineers by holding down wages and through ill treatment of the men. "He is ordering them about as tho [*sic*] they were dogs and if they don't do exactly as he orders he discharges them and blacklists them with the Civil Service Board," Colding wrote. Playing on the prevailing anti-German

sentiment associated with the United States' involvement in World War I, he went on to say:

> I was born a gentleman and am rated as such by all that know me, and I take insults from no one especially from one who has so many galvanized Americans of German birth working for him that he imagines himself to be and acts like the Kaiser. If you will muster his dredging force look them over and then call the roll. You will think that this is not America but Germany.

He protested that the superintendent of the fleet in Savannah, Charles G. Bochman, and the chief engineer on the *Savannah,* Otto Richter, were "both native born Germans." In claiming that Millis fired two "native born American engineers" without reason, Colding commented, "Surely the Kaiser should recognize and reward him."[45]

In spite of these and other accusations, Colonel Millis was exonerated by the special investigation ordered by the Chief of Engineers and carried out by Colonel J.F. Reynolds Landis of the Inspector General's department. In an item-by-item rebuttal, Landis's report reviewed and dismissed the various charges made against the District officer by Colding, the mayor, and other critics. The special investigator stated, "The results obtained in the Harbor of Savannah have not been those projected or hoped for but the failure to attain those results has not been due to the inefficiency of the engineer officer in charge...."[46] In the meantime, however, Millis was transferred to Chicago, where he became Department Engineer for the Central Department.

The news of Millis's transfer was made public before the release of the Landis report. And even though he was vindicated and the Chief of Engineers' office explained that his transfer was routine and in no way a demotion, it appeared that the Savannah critics had won their case.[47] The Chief of Engineers, William M. Black, confessed to Senator Hoke Smith, "It is needless to say that I am very much embarrassed by the constant friction in Savannah."[48] Never before had the Savannah District office of the Corps of Engineers experienced such negative relations with the civic leaders of that city. Colonel Frederick W. Alstaetter, Millis's brother-in-law, was appointed as the new District Engineer.

World War I greatly affected the improvement of Savannah Harbor. As peace was returning to Europe in 1919, local harbor watchers complained that shoals still threatened ships using the port. Some continued to attack Colonel Millis, but conceded that his successor was hampered now by too few dredges and insufficient financing due to high wages and high supply costs, which consumed current appropriations.[49] According to the Chief of Engineers, all work done since 1917 had been for maintenance only, and training walls, spur dikes, and jetties needed repairs. Moreover, he said, inadequate numbers of government plant in recent years made even maintaining project depths impossible.[50]

During the 1920s and 1930s, the project evolved into a more complex operation due to the need for a larger and more well-developed harbor to accommodate the expanding numbers and sizes of ships. In addition, the deeper drafts of ships necessitated deepening the harbor. At the same time, more and more companies located their factories or plants farther upriver because the marshy lowland below the city was not suitable for such construction, a situation predicted years earlier by Colonel Kingman. This commercial development,



*The wharf and yard of the Savannah Creosoting Company in the upper reaches of Savannah Harbor in 1924. A large part of the yard was leased to the Mead and Manucy Company whose piles are shown in the picture. The Savannah Sugar Refining Corporation is seen in the distance at the left. (Savannah District, Corps of Engineers)*

plus the availability of railroad connections above the city, prompted extending and later deepening the harbor upstream to serve the ships of these companies.[51]

Even as the United States had entered the Great War in 1917, Congress had included several provisions in that year's rivers and harbors act that reflected the coming trend. The act called for enlarging the harbor channel to 30 feet deep and 500 feet wide from the sea up to Quarantine, a distance of approximately 10.5 miles. It provided for widening the 26-foot channel to 600 feet for a turning basin at West Broad and Barnard streets and to 900 feet opposite Fort Oglethorpe to create an anchorage there. Congress also authorized building additional closing dams, spur dikes, and training walls; closing off the South Channel with a rock dam; and dredging a cut between Savannah River and Habersham Creek as a part of the inland waterway.[52] Three years later Congress asked the Corps to examine the full harbor; to report on the possibility of consolidating all projects relating to the harbor; and to recommend any necessary widening, deepening, and straightening of the harbor in response to demands of commerce.[53]

At that time, the Corps significantly increased the dredging activities in the harbor. Some well-known dredges used were the *Cumberland, Savannah,* and *Morgan,* along with the *Gilmer,* recently purchased from the Panama Canal Commission. Contract dredging was done as well. The District generally asked for additional maintenance funds not only to meet increased dredging costs, but also to expand maintenance operations. In 1921 Colonel Altstaetter reported that the 21-foot-deep upper section of the harbor extending to Kings Island was completed.[54] However, the 26-foot section remained unfinished even after years of dredging. While the Corps achieved the project depth at one time

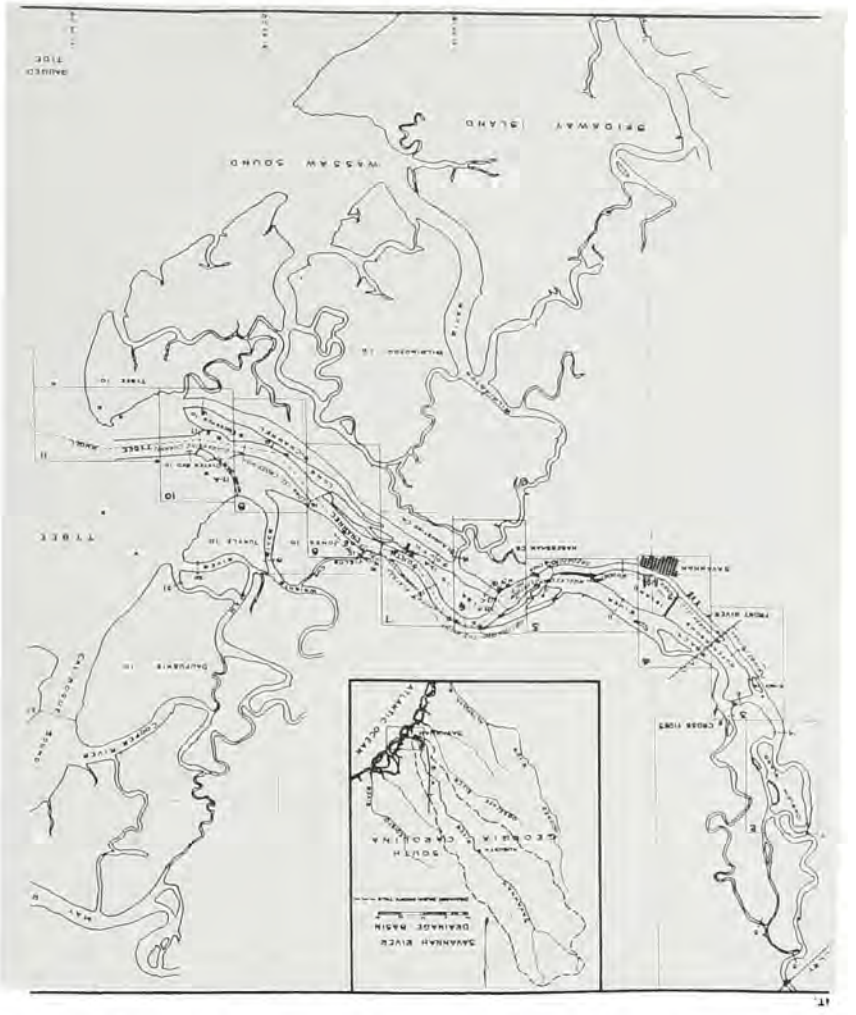


*A ship discharging sugar at the wharf of the Savannah Sugar Refinery in the upper section of Savannah Harbor adjacent to the wharf of the Savannah Creosoting Company, 13 May 1925. (Savannah District, Corps of Engineers)*

or another in all parts of the channel, at no one time did the full length of this section reach specified dimensions because of the persistent shoaling.

Through the 1920s, improvement dredging took place at Tybee Knoll, Tybee Roads, and Tybee Bar as part of the 30-foot project. The widening of the channel at Barnard Street was finished in 1924, and the Oglethorpe anchorage basin, including construction of mooring dolphins, was completed in 1926.[55] Despite frequent warnings by successive District Engineers, including Colonel Altstaetter, Major Dan I. Sultan, and Major William F. Tompkins, that the training walls, spur dikes, and jetties needed repairs, little was done. The one exception was the Oyster Bed Island training wall, which was raised to mean high water as of 1923.[56]

In 1926 the Chief of Engineers recommended several changes based on the studies done by the Savannah District. All of his comments and concerns focused on the shoaling problem in the harbor vis-a-vis the expense of maintaining depths adequate to the needs of ships using the port. He emphasized that maintaining a harbor channel deep enough to accommodate ships was a "very difficult and expensive problem" and affirmed that dredging to remove silt deposits required the major expenditures in Savannah Harbor. He further asserted, "This expense cannot be eliminated, but it can be materially reduced



*Map of Savannah Harbor, 10 July 1923. (H. Doc. No. 262, 69th Cong., 1st Sess.)*

by works so designed as to increase the scouring effect of the river current and the ebbtide.''[57] Thus, attention was again focused on using tidal flow to retard buildup of sediment in the channel instead of merely dredging.

Congress incorporated the Chief's recommendations into the 1927 Rivers and Harbors Act by modifying the project to provide for increasing the flow of water through the harbor. This plan called for constructing a regulating dam at the western end of the South Channel, which would allow the flood tide of the channel to flow into the upper harbor but would close during the ebb tide and thus divert the water through the North or main channel of the harbor. In addition, further dredging of the channels of Oyster Bed Island, Kings Island, and Drakies Cut would facilitate freer movement of water at the flood tide. Also, the raising of the Long Island training wall would prevent the escape of water over it during ebb tide and instead force the water through the channel. The act also provided for extending the harbor farther upriver with a channel 21



*Piles belonging to the Mead and Manucy Company lie in the yard of the Savannah Creosoting Company in Savannah Harbor in 1924. A tanker discharges creosote oil at the wharf on the left, and on the right ships discharge sugar at the Savannah Sugar Refining Corporation's wharf. (Savannah District, Corps of Engineers)*

feet deep and 200 feet wide from Kings Island to the Savannah Creosoting Company, at the confluence of the Front and Middle rivers, a distance of some 2.1 miles.[58] Three years later Congress again authorized enlarging the harbor by extending the 26-foot channel up to the foot of Kings Island.[59] During 1929 Savannah had spent $78,856 to increase the depth in this section of the harbor, but now the federal government through the Corps of Engineers took it over.[60]

Obviously, these were busy years for the Savannah District as related to work in the Savannah Harbor. Major Douglas L. Weart commanded the District during this period, and under his leadership most of the more recently authorized project modifications were completed. For example, the 21-foot channel above Kings Island was finished in 1929, as was the widening of the channel adjacent to Kings Island. Dredging of the 30-foot section of the harbor to a width of 500 feet and the widening of the channel at Oyster Bed Island were completed in 1930, and raising the Long Island training wall, dredging in Drakies Cut, and expanding the channel to the 26-foot depth up to Kings Island were all completed in 1931. In the meantime, the Corps continued maintenance dredging as well. This work was done largely by government plant because contractors, according to the District Engineer, seldom offered bids on the dredging jobs. Weart said that the nature of the dredging required a frequent shifting of dredges from one site to another, and it was impossible to effectively estimate costs due to variation in dredged materials in different locations.[61]

Their work on improving Savannah Harbor brought praise and respect to the Engineers. A spokesman for the Savannah Bar Pilots declared in 1931, "We believe that the present condition of the harbor is better than it has ever been before and with the earnest and intelligent efforts now being put forth by the

District Engineer Officer it is felt that conditions will continue to improve."[62] Indeed, conditions in the harbor did continue to improve. To take further advantage of the river current and tidal flow as an aid in silt removal, the Corps began agitation dredging similar to that done earlier in the century. Dredged materials were dumped onto vessels and allowed to flow overboard. Because they remained suspended for a long time, the currents carried them out to sea. According to Ralph Rhodes, principal Engineer in the Savannah District office at the time, this type of dredging not only increased harbor depths, but improved the river's hydraulic conditions. With the natural water flow through the channel, the proper harbor depths could be maintained at reduced maintenance costs.[63]

The Rivers and Harbors Act of 1930 authorized yet another survey of the harbor from the bar to the upper limits to determine the need to widen and deepen the harbor. (Local harbor interests had requested the expansion.) The Savannah Port Authority wanted the 26-foot channel to Kings Island to be deepened to 30 feet, and they supported development of a turning basin at the head of the channel. Moreover, various industries located along the upper harbor sought to expand that section to make it 25 feet deep and 300 feet wide. According to the District Engineer, the harbor's current depths were insufficient to accommodate the deeper-draft vessels seeking entry into the channel. The subsequent recommendations from District Engineer Major Creswell Garlington, supported by the Board of Engineers for Rivers and Harbors and the Chief of Engineers, were authorized in 1935.[64]

The new legislation eliminated from the project the regulating dam across the South Channel, construction provided for in the 1927 Rivers and Harbors Act but never carried out. Major Garlington reported that shoaling in the South Channel was so severe that a regulating dam would be ineffective in helping to maintain sufficient current flow in the main channel. Moreover, it was determined that the dam actually would reduce the overall velocities of the outgoing ebb flow from the harbor above, and thus would reduce rather than enhance the actual scouring effect.[65] At the same time, the law removed provisions for further extension of training walls, revetments, and jetties. In accordance with the provisions of the 1935 Rivers and Harbors Act, dredging of the harbor to new depths was to be the principal focus of Corps activity in the later years of the Depression. The act provided for a harbor 30 feet deep and 500 feet wide from the 30-foot contour in the ocean to the Quarantine Station, a distance of 10.2 miles; 30 feet deep and 400 feet wide from the Quarantine Station to the Seaboard Air Line Railway bridge, a distance of 16 miles; 26 feet deep and 300 feet wide to the foot of Kings Island, a distance of 1.3 miles; and 26 feet deep and 200 feet wide to the Savannah Creosoting Company just above the junction of the Front and Middle rivers, a distance of 2.1 miles. The full length of the Savannah Harbor project was 29.6 miles.[66] The law also called for dredging the turning basin near the upper end of the harbor and enlarging the 26-foot channel to a width of 600 feet for a distance of 600 feet.[67] Using government plant and hired labor for this new phase of harbor development, the Army Engineers succeeded in attaining the required depths by 1937.[68]

The ongoing improvement of the harbor brought praise from commercial leaders in the Savannah area, but some people protested the continued deepen-

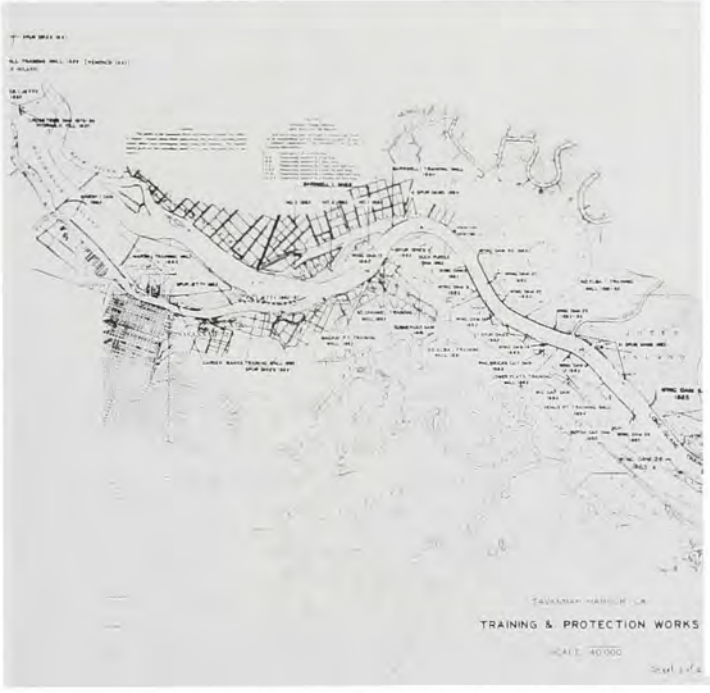


*An aerial view of the Seaboard Air Line Railway bridge at Savannah Harbor. It was the only bridge across the harbor and thus was an important project marker in the development of Savannah Harbor in the 20th century. The Diamond Match Company is located just above the bridge. Note the lumber rafts in the lower left hand corner. c. 1924 (Savannah District, Corps of Engineers)*

ing of the channel. William S. Lovell, a resident of Tybee Island, which is located at the mouth of the Savannah River, charged that the serious erosion of Tybee Island's beaches resulted directly from the Corps' channelization and other work in the harbor and at its mouth. In fact, Lovell's father, Robert P. Lovell, had made similar complaints in 1908 as mayor of Tybee Island. He accused the Corps of Engineers of carrying out harbor improvements that caused beach erosion on the south end of the island and demanded that the U.S. government take measures to protect private property. In 1924 another irate Tybee Island citizen had criticized the Corps' activities, asserting that the Engineers seemed "to take a very calm and detached view of the situation, but they may find that it will be more costly to the Government to neglect matters now than it would be to give them their immediate and earnest attention." This same individual threatened to seek compensation in the U.S. Court of Claims for property damages he claimed were caused by harbor improvements.[69] William Lovell and other critics proposed that the Corps build jetties out across the bar to control river currents and thus beach erosion on Tybee Island.[70]

Commercial interests in Savannah added their support for the proposed jetties but for a different reason; they saw the jetties as providing a more protected route for ships entering and leaving the harbor. At the same time they




*Two charts showing the training and protection works constructed in Savannah Harbor by the Savannah District of the Corps of Engineers through 1937. (Savannah District, Corps of Engineers)*

called for deepening the upper end of the harbor to 30 feet, thus providing a uniform depth throughout that would accommodate deeper-draft vessels going to new industries locating farther up the harbor. (The 1935 specifications for the harbor had not responded to this need.) Also, they advocated widening the harbor to provide an additional turning basin adjacent to the wharves of the Atlantic Coast Line Railway.[71] The House Rivers and Harbors Committee asked the Corps of Engineers' Board of Engineers for Rivers and Harbors to examine the project. District Engineer Raymond R. Fowler supervised the restudy, which the Board of Engineers and the Chief of Engineers reviewed. The idea of two jetties extending across the bar was rejected as too expensive and unnecessary both in terms of erosion control and improvement in navigation. In fact, the Corps of Engineers' Shore Protection Board reviewed the proposal for jetties and ruled that the erosion resulted not from harbor work and improvements but rather was part of the natural phenomena of the coastline, which could best be dealt with by beach protection works. (Colonel Kingman had made the same statement in 1908.) The report did, however, advocate the other improvements requested. It called for widening the existing channel from 400 feet to 550 feet for a distance of 5,000 feet in the vicinity of the Atlantic Coast Line Railway terminals, as well as deepening the harbor above the Seaboard Air Line Railway bridge from 26 to 30 feet at mean low water.[72]

As the Corps prepared to continue expanding the harbor, it again focused on efforts to improve hydraulic conditions in the channel to help control shoaling. For example, the Engineers closed off the Cross Tides channel in 1937 with an earth dam. As previously noted, this channel was a slough at the upper end of Hutchinson Island connecting the Back River with the Front River, the main part of the harbor along the Savannah waterfront. The new dam was necessary to direct more fully the flow of the current through the Front River. The same purpose was served by the Fig Island training wall, which had been built decades earlier at the confluence of the Front and Back rivers at the low end of Hutchinson Island. Because this structure had settled and disintegrated over the years, the Savannah Engineers built a new training wall at the site, which was completed in 1940.

Removing Quarantine Point, near the mouth of the river, also helped eliminate obstructions to the tidal flow. This long-time landmark jutting out into the river had obstructed the tidal flow and river currents. So when the Quarantine Service no longer needed the site, the Corps dredged the point away in 1939. At the same time, maintenance dredging and repairs to existing structures in Savannah Harbor consumed much of the District's time and attention.[73] Congress, however, took no action on the Corps of Engineers' latest recommendations before World War II intervened to delay any new harbor improvements for several years.

## COWHEAD RIVER

One of the smaller projects assigned to the Savannah District was to improve the Cowhead River, known locally as the Cowhead Cut. This river was merely a narrow water connection between Tybee Creek and Lazaretto Creek, east of Savannah, passable only at high water because it was virtually dry during low tide. Improvements there, however, would provide a sheltered passage from



*Placement of lumber mattresses bordered on each side with rip rap stone. 8 February 1940*



*Placement of a core of oyster shells on the mattresses between rows of rip rap stone. 23 April 1940*



*Rip rap stone placed over oyster shell core. 23 April 1940*



*Completed Fig Island Training Wall in Savannah Harbor. 11 October 1940*

*Four photos showing the stages in construction of the Fig Island Training Wall in Savannah Harbor by the R. L. Morrison and Sons Company, contractors with the Corps of Engineers, in 1940. (Savannah District, Corps of Engineers)*

Savannah to the south end of Tybee Island for light draft boats at all tide stages.

Congress provided for a preliminary survey and examination of the river in the 1910 Rivers and Harbors Act, and Colonel Kingman's report recommended dredging a straight cut 6 feet deep at mean low water with a bottom width of 75 feet for a distance of 1,500 feet. The District officer further recommended that local interests be required to contribute one-half of the total estimated cost of $6,000 and provide, free of charge, the right-of-way for the cut. Congress incorporated these recommendations into the provisions of the 1912 Rivers and Harbors Act.[74] The U.S. pipeline dredge *Morgan* made the cut in April and May 1913, exceeding the minimum dimensions by dredging a channel 10 feet deep and 140 feet wide at the bottom.[75]

Not only did the Cowhead Cut channel become self-sustaining; it also tended to deepen itself over the next several years. Boats using the passage were restricted to five- to eight-foot drafts, which was determined by the depths of the two creeks connected by Cowhead Cut. While the Corps estimated that the improvement reduced rates on some commerce to Tybee Island by as much as 33 percent, the project mainly benefited the pleasure craft that passed back and forth between Tybee Island and Savannah, particularly in the summer months. A small steamer also operated on the passage for several years.[76] In 1921 the District officer, Colonel Altstaetter, dropped Cowhead River from the annual reports.

# 5 SAVANNAH RIVER

During the late 19th and early 20th centuries, Savannah Harbor was the District's major civil project. The Savannah River, however, had commercial and economic importance beyond its mouth, and the Corps of Engineers was responsible for developing the navigational potential of the river upstream as well.

Before the Civil War, the river had been a vital commercial artery from the interior of Georgia and parts of South Carolina to the sea, but the coming of the railroads relegated the waterway to a secondary status. The Civil War was "the ending of an era," wrote one observer. "The river would still be there when new times came, but the railroads would dim the importance it had once known."[1] Nonetheless, Congress incorporated the Savannah River into its program of post-Civil War era river improvements to be carried out by the Corps of Engineers. The work on the river was divided ultimately into three projects; the Savannah River between Augusta and Savannah, the river above Augusta, and the river at Augusta.

## SAVANNAH RIVER BELOW AUGUSTA

Below Augusta the river carried considerable sediment, which increased during periodic and seasonal flooding. The bottom of the river was composed of fine sand and mud, with rock formations in some places. Navigation on the river in its original state was hampered by shallow water due to sand and gravel bars and by thousands of snags and stumps, the result of trees being uprooted on the banks by action of the current. Overhanging trees on the riverbanks were also a constant problem to boats. Before improvement, the Savannah River provided navigation for steamboats drawing 4 to 5 feet of water for the greater part of the year. During the dry fall months, however, the water was as low as 2 to 3 feet on some of the shoals or sandbars. This meant that boats usually had to be unloaded and their cargoes portaged around the bars. For the first 30 miles below Augusta, the most troublesome region, the river meandered slowly through a wide channel and created seven of the nine sandbars that interfered with navigation between that city and Savannah. This section was also plagued by cave-ins and bank erosion caused by action of the river's current against the sandy banks, especially in times of high water.

The length of the Savannah River between Augusta and Savannah was

described in various annual reports as 248 miles,[2] 273 miles,[3] and 202.5 miles.[4] The last distance noted was based on an 1889 survey directed by Lieutenant Oberlin Carter, who was at that time the Engineer in Charge of the Savannah District operations. Carter stated that the distance formerly had been greatly overestimated, "never, so far as is known, having been established by an actual survey until that of 1889 was made." According to his survey, the river basin below Augusta had an area of approximately 3,211 square miles with a width averaging 30 miles. This provided a total drainage area of 10,505 square miles. In the lower portion of the valley the soil was sandy and fertile, forming good farmlands.[5]



*A Corps of Engineers' survey party on the Savannah River in the late 19th century. (Savannah District, Corps of Engineers)*

The original project between Savannah and Augusta dated from 1880. Section 2 of the Rivers and Harbors Act of 1880 provided that an examination and partial survey be made of the Savannah River from Savannah to Augusta to determine a preliminary plan of improvement and estimate of costs.[6] Colonel Quincy A. Gillmore directed Sewall L. Fremont, Assistant Engineer in Savannah, to conduct this examination. Fremont's report was transmitted by Gillmore on 22 December 1880 and became the basis for the project of improvement. The object of this initial project was to provide a low-water navigable depth in the river of at least 5 feet. Most of the work was to take place in the section of the river within 100 miles below Augusta and included constructing low wing dams to help prevent formation of sandbars and shoals, protecting banks with brush mattresses, removing snags and logs, cutting overhanging trees from the banks, straightening the channel in some locations, and dredging.[7]

Gillmore reported in 1881 that because of the characteristics of the river below Augusta, improvement would involve a more comprehensive system of works than was required elsewhere. In comparing the Fremont report of 1880 with the survey of the river made in 1854 by Captain Jeremy F. Gilmer, Gillmore noted that "many 'cut-offs' have occurred since the examination of 1854, and several within the last few years."[8] The river's dynamic character created continual navigation problems. Many of the shoals that obstructed navigation in the earlier years still existed in 1880, while others had disappeared and some new ones had been formed. The current constantly undercut the banks, producing new snags and obstructions as trees and logs collapsed into the water. As of 1887 Carter stated that "the low-water channel at those places where wing dams have been constructed is not at present in a satisfactory condition."[9]

While recognizing the problems created by the natural conditions of the river, Carter placed some of the blame on Congress. He lamented that as in the case of Savannah Harbor, intermittent and insufficient appropriations prevented completing the improvements below Augusta before nature reversed the benefits.

> When operations have to be suspended from want of funds, the river is again left to itself; the means are not at disposal to keep the partially improved reaches under proper surveillance, which would enable the engineer in charge to note the...changes in the regimen of the river, and to decide what should be done at each locality to aid a favorable development of the channel.... And even if such careful watch were held, no funds would be available to make prompt repairs where freshets have injured banks or dams, or to complete the proposed system . . . where the partially finished work has failed to produce any marked or continuous improvement.[10]



*A typical landing on the banks of the Savannah River where river boats tied up for business with area residents. Notice the U.S. snagboat* Toccoa *at right. n.d. (Savannah District, Corps of Engineers)*

Even the Corps' equipment, according to Carter, suffered from this situation. For example, the snagboat *Toccoa,* built in 1882 to operate on the Savannah and Altamaha rivers, was often tied up for months because of "irregular and inadequate" appropriations for the project. Because of a climate conducive to rapid decay, numerous and costly repairs had to be made to the boat that could have been avoided had the *Toccoa* been kept in commission.[11] Ultimately, the boat deteriorated and burned in 1898.

Carter recommended that improvements be continued on the Savannah River between Augusta and Savannah. Congress responded by adopting a new project in the 1890 Rivers and Harbors Act. The new work would be much the same as that already carried out: contraction works and bank protection as the primary protection against sandbars, removal of snags, and cutting of overhanging trees along the riverbanks.[12]




*The steamboat* Katie *was an important source of transportation for passengers and cargo on the Savannah River between Savannah and Augusta from 1870 to 1895 when it was destroyed by an explostion. n.d. (Savannah District, Corps of Engineers)*

By 1896 Carter was reporting that the river improvement had been accompanied by a steady increase in river traffic, especially in manufactured cotton goods from Augusta as through-freight for export from the port of Savannah, and by a decrease of freight rates. Estimates were that the annual commerce on the river had increased at the rate of ten dollars for every dollar that the federal government had spent on improvements, and the freight rates had been reduced by about 20 percent.[13] The number of steamboats operating on the river had increased from two in 1880 to five in 1896. However, Congress failed to appropriate any further funds for improvement of the river between 1896 and 1899.

Captain Cassius E. Gillette succeeded Carter as District Engineer in 1898. In criticizing his predecessor, Gillette charged that while "considerable work" had been done, little progress had been made toward achieving the 5-foot depth. Moveover, he asserted that spur dams built to contract the channel and/or

protect the banks from erosion were ineffective. In some cases they had all but disappeared, and two blocked steamboats and needed to be removed.[14]

The Rivers and Harbors Act of 1899 appropriated the first funds for the improvement of the Savannah River since 1896. It made $20,000 available, "Provided, that a contract or contracts may be entered into by the Secretary of War for the materials and work that may be necessary to complete the existing project of improvement," or, more specifically, the project as of 1890.[15] Gillette proposed using these funds to establish the prescribed 5-foot channel from Savannah to within 18 miles of Augusta and to carry on snagging operations. He, too, argued for sufficient funding to finish the work, asserting that the results

> accomplished by the first portion of the work should be promptly followed up by other work designed to hold and augment the improvement obtained. To this end it is desirable to have funds continuously available, so that work required can be promptly done at the most advantageous time.[16]

In the early 20th century the Engineers came to rely on training dikes in the war against sandbars. Built under contract primarily by Albert J. Twiggs and Sons of Augusta, the dikes were approximately 6 feet wide and constructed of small pilings that were then filled in with bundles of brush and rock and held together with cross-ties. These structures were built between 1 and 2 feet above mean low water and extended out from the riverbanks diagonally downstream to a point near the top of the shoal, then continued downstream parallel to the opposite shore to a point below the bar. The purpose of the training dike was to contract the river's width and control the flow of the current, using it to remove the shoal "without undue erosion to the opposite bank, or without undue interference with the flow of the river at the flood stage." Following their



*View of Canoe Cut on the Savannah River near Augusta in 1916 showing caving banks and the remains of earlier shore protection works. This particular section of the Savannah River presented the Corps with some of its most difficult problems in preventing bank cave-ins. (National Archives, RG 77, Entry 103, file 7914/392)*

construction, however, repairing and maintaining the dikes consumed a great deal of the Corps' attention.

By 1910 sandbars had been removed from 13 locations by means of training dikes and shore protections.[17] The Corps also used a technique that involved dragging heavy anchors over the bars as a way of reducing them.[18] Each year the Savannah District office also provided for snagging operations with the snagboat *Tugaloo* and for the cutting of overhanging trees along the banks.

In the upper 20 miles of the river below Augusta, bank erosion continued to plague the Army Engineers, because freshets often caused riverbanks to cave in causing additional shoals and snags. Captain Gillette stated that establishing the project depth in the river would not be difficult, but maintaining that depth would be a problem because of the unstable banks.[19] The Corps resorted to building training walls and revetments partially up the banks, construction that also required frequent repair.

As early as 1903, Lieutenant Colonel James B. Quinn, the new commander of the Savannah District, recommended a survey to determine the feasibility of building a series of locks and dams as the principal means of ensuring sufficient channel depths for navigation. Congress finally passed enabling legislation in the 1907 Rivers and Harbors Act. Colonel Dan Kingman supervised the survey and submitted the report. In 1910 Congress approved a modified project for the entire length of the Savannah River between Augusta and Savannah and targeted the 30 miles below Augusta for special attention, but the authorization did not provide for the suggested locks and dams. The modification focused the Corps' efforts on protecting the channel from silt dropped into it by the collaps-



*One type of river bank protection built by the Corps of Engineers on the Savannah River below Augusta as seen in 1915. Note the same type of construction on the other side of the river in the distance. (Savannah District, Corps of Engineers)*

ing banks and included plans for constructing new bank protections and training walls made of pile, brush, and rock as well as repairs to existing works. It also provided for continued snagging operations and cutting of trees on the banks. Moreover, the project now included dredging operations.[20]

For the regulating works, the Corps continued to rely on contracts and open market agreements with private companies such as A.J. Twiggs and Sons of Augusta and the Simons-Mayrant Company of Charleston, South Carolina. The remainder of the project activities were carried out by hired labor on government plant such as the aforementioned snagboat *Tugaloo* and a new 10-inch pumpboat *Augusta,* built specifically for the Savannah office and the Savannah River project.[21] The Corps met the congressional mandate to complete the project in four years, having attained the 5-foot steamboat channel at ordinary summer low water in 1915.[22]



*The U.S. pumpboat* Augusta *at work on the Savannah River in 1912. (Georgia Department of Archives and History)*

Over the next several years the Savannah River improvement project was relegated to the category of less important works. One reason was the completion of the 1910 specifications; another was the cutbacks in funding for civil works because of World War I. During the war years the Corps did a minimum of maintenance work and requested no new funds. As a result, contraction works and shore protections fell into disrepair, and the controlling depth of the channel diminished.

Colonel Altstaetter, District Engineer in the years immediately following the war, asked Congress for increased maintenance funding for the river. Accordingly, during the 1920s the Savannah District renewed snagging operations and bank protections, which included paving activities and constructing stone-



*Workers constructing brush mattresses of fascines for use in bank protection works on the Savannah River below Augusta in July 1923. This particular mattress was composed of two layers of fascines and measured 21 feet by 200 feet. There were 358 fascines used in this mattress which took 13 men six hours to build. (Savannah District, Corps of Engineers)*

covered brush mats and stone-weighted mattresses that were placed in front of pavement stone to reduce scouring along the banks.[23] The work was done by hired labor. However, this renewed attention failed to reverse the effects of the years of neglect, and the controlling depth of the Savannah River declined further.



*Workers placing stone on brush mattresses as part of the shore protection works on the Savannah River below Augusta in July 1923. (Savannah District, Corps of Engineers)*

In the meantime, the 1922 Rivers and Harbors Act called on the Corps for a new survey. As a result of the District officer's report, the Chief of Engineers, Major General Edgar Jadwin, recommended further project modifications. Congress finally responded in 1930 by authorizing a channel 6 feet deep at ordinary summer low water and 765 feet wide from the upper end of the Savannah Harbor project to Augusta. The new plan called for the usual channel contraction works, bank protections, snag removal, cutting of overhanging trees, and dredging of bars. It also provided for a lock and dam, an idea suggested years earlier but never acted on, at Rifle Cut nine miles below Augusta. Because of earlier Corps work on this section of the river, the new project was considered to be 33 percent complete, although the existing construction needed repairs.[24]



*Two Corps of Engineers snagboats and a dredge on the Savannah River at Augusta in the 1920s. (Savannah District, Corps of Engineers)*

The economic crisis of the 1930s brought not only a scarcity of funds but a decline in commerce. The Chief of Engineers commented in 1931 that "the relative importance of the project in the interest of commerce and navigation entails the postponement of new work on the project at this time."[25] As a result, the Engineers' major work was in keeping the river channel as open to navigation as possible.

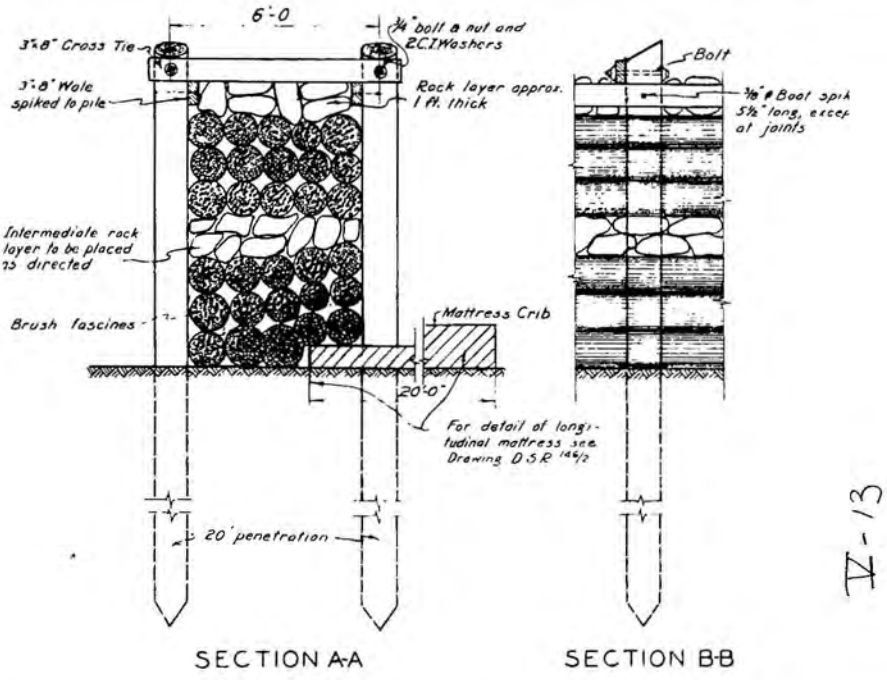
In 1933 Franklin Roosevelt's New Deal injected new life into the project to improve navigation on the Savannah River. Construction of a lock and dam at New Savannah Bluff 13 miles below Augusta was included in the program of the Public Works Administration (PWA) created under the National Industrial Recovery Act of 1933. The PWA, under its fiscally conservative administrator Harold Ickes, authorized the lock and dam on 27 September 1933. Project plans called for a lock 56 feet wide and 360 feet long, with a lift of 15 feet. The




*A crew of contract workers placing the inner core of brush fascines in a pile dike built at right angles to the shore and used for channel contraction on the Savannah River below Augusta, 21 September 1935. (Savannah District, Corps of Engineers)*




*A completed pile dike used for channel contraction Augusta. Note the inner core of brush fascines topped by a layer of rip rap stone, 21 September 1935. (Savannah District, Corps of Engineers)*




*A completed pile dike and revetment works built on the Savannah River below Augusta as part of the channel contraction effort and bank protection as of 25 October 1935. (Savannah District, Corps of Engineers)*




*Detail of plans for pile dikes constructed on the Savannah River below Augusta in 1935. (Savannah District, Corps of Engineers)*




*A permeable pile dike on the Savannah River below Augusta, one of the types of channel contraction works used by the Corps of Engineers in the Savannah District as of 1 February 1938. (Savannah District, Corps of Engineers)*

dam was to be a concrete fixed dam with five vertical-lift crest-control gates set between concrete piers.

The Savannah Bluff site marked a change from the original Corps-designated site at Rifle Cut; the Chief of Engineers already had proposed the change based on the recommendation of the Board of Engineers for Rivers and Harbors. The board felt the new location would create a pool that would in turn "overcome a difficult and shallow stretch of river immediately above the New Savannah Bluff site."[26] The PWA started preliminary work immediately following Ickes' approval. By the end of 1934, PWA money was financing contract work on the structures. Congress adopted the New Savannah Bluff project as part of the Corps of Engineers' civil projects and approved the new location in the 1935 Rivers and Harbors Act. However, the PWA continued to pay for most of the new work on the lock and dam. The Corps of Engineers continued in its maintenance role and was responsible for channel improvements using the U.S. snagboat *Macon* and U.S. pipeline dredge *Creighton*. The dam and lock were completed in early 1937, and all other aspects of the project were achieved by 1939.[27]

The Corps of Engineers readily admitted that the commerce using the Savannah River between Augusta and Savannah declined because of the railroads, but Corps records reflected a general though sometimes irregular increase in tonnage of commodities carried over the river during the first three decades of the



*The New Savannah Bluff Lock and Dam on 16 October 1940. One barge in the two has already been locked through and waits as another barge and the tug exit the lock. (Savannah Disrict, Corps of Engineers)*



*A timber raft on the Savannah River below Augusta in 1915 showing a principal way of bringing lumber down the river to lumber mills down stream or for shipment from Savannah. (Savannah District, Corps of Engineers)*




*The steamboat* Two States *completed its maiden round trip voyage between Savannah and Augusta in Savannah on 17 May 1908. (Savannah District, Corps of Engineers)*

20th century. Statistics showed that 45,800 tons of goods passed over this section of the river in 1900, not including 104,167 bushels of rice and 5 million feet (board measure) of timber. In 1929 the total had increased to 133,000,727 tons. In 1904 as many as seven steamboats made regular trips between the two terminal cities, although the number of steamers during these early years was generally closer to four. At this time the river was an outlet for such Georgia commodities as cotton and cotton-factory products, naval stores, and fertilizers as well as for timber rafted downstream and rice transported principally in lighters down to Savannah. General merchandise likewise was brought up the river to the markets of this part of rural and small-town Georgia. According to the Corps of Engineers, as a result of improvements, freight rates were reduced between 30 and 50 percent, depending on the nature of the commodity.[28]

## SAVANNAH RIVER ABOVE AUGUSTA

The navigational value and potential of the rivers in the eastern United States generally diminished in the reaches above the fall line as streams became shallower and narrower. Such was the case with the Savannah River above Augusta. This river is formed above Augusta by the junction of the Tugaloo and Seneca (or Keowee) rivers and flows southeast. The distance from Augusta to Andersonville, South Carolina, where the Savannah River begins, is 107.5 miles. The Tugaloo River was navigable for an additional 46 miles to Tallulah Falls. Navi-

gation on the Savannah River above Augusta was difficult even for pole boats and rafts due to shallow water and obstructions such as logs, snags, rocks, and sandbars.

An 1878 act of Congress provided that this portion of the river be examined to determine its condition from Augusta to the head of pole-boat navigation on the Tugaloo River at Tallulah Falls and to ascertain the feasibility and costs of improvements.[29] The study was done in late 1878 by Assistant Engineer J.P. Carson under the direction of Colonel Gillmore.

In carrying out his survey, Carson engaged a local pilot and crew and used a pole boat, a craft well adapted to pass over the river rapids. The examination was made during an exceptionally low stage of water, making it easy to observe rocks and other obstructions to the fullest extent possible. The obstacles to navigation were found to be "numerous, extensive, and not infrequently quite dangerous."[30] These consisted chiefly of rocky ledges running across the channels, isolated boulders of varying sizes, and gravel shoals. The aggregate length of the shoals was estimated to be nearly 35 miles out of the total length of the river.

The land on both sides of the river above Augusta for approximately 124 miles was devoted to raising cotton. Carson noted, however, that it also was suited to producing tobacco, grain, and indigo. For the next 30 miles upstream, the land was used generally for raising corn, although it was well timbered, and some gold mining was carried on. Limestone was abundant, and some places had extensive iron ore beds. In 1876 and 1877 approximately 12,000 bales of cotton were floated down the river to Augusta. Although this comprised only a little more than six percent of the average annual receipts of cotton from all sources at Augusta, Carson concluded that improving the river would encourage further commercial development. He added that the sufficient amount of water in the river would, "if properly regulated," eliminate the navigational hazards and even allow the use of steam vessels above Augusta, thus reducing transportation costs.[31]

Colonel Gillmore noted that the 64 mile length of the river from Augusta to Trotter's Shoals was more gradual in slope than the rest of the river and thus was conducive to simpler forms of improvement. Therefore, that stretch should receive the most attention, he said: "Any appropriation which may be made should, in my judgement, be expended upon this portion of the river, until a thorough examination from Trotter's Shoals to Andersonville, and perhaps as far as Brown's [Shoal] on the Tugaloo [150 miles above Augusta], can be made."[32] Congress followed Gillmore's report with a project authorization in the 1880 Rivers and Harbors Act. This law provided for a channel 3 feet deep and 30 feet wide from Augusta to Trotter's Shoals and for removal of snags all the way to the Tugaloo River.[33]

Between 1880 and 1883 various rivers and harbors acts appropriated funds to improve the Savannah River above Augusta. Improvement was restricted, however, to the section of the river between Augusta and Trotter's Shoals and sought to establish a pole-boat channel only 20 feet wide and 3 feet deep. Carson's 1879 report suggested that these improvements could be accomplished by cutting through the smaller gravel shoals and by building wing dams to constrict the flow of water across the larger ones. The dams could be built of the boulders

and gravel excavated from the riverbed and banks. This work subsequently was contracted out using funds appropriated in 1880 through 1883. By 30 June 1883 a channel 20 feet wide and 2.5 feet deep at summer low water had been completed from an area known as "the Locks," several miles above Augusta, to Bardsdale Ferry, 50 miles above the city. The Locks were adjacent to a previously constructed dam at the head of the rapids just above Augusta. The reservoir above the dam was connected to Augusta by the Locks Canal, through which vessels could pass into the city, but that waterway did not enter the river below Augusta.[34]



*The Locks and dam located above Augusta on the Savannah River. The Locks Canal led from the reservoir above the dam into the city of Augusta. n.d. (Richmond County Historical Society)*

Operations on this project were suspended in August 1883 and did not resume until after 1890.[35] The 1888 Rivers and Harbors Act required that another examination be made of the Savannah River between Augusta and Andersonville. Lieutenant Carter, then Savannah District Engineer, supervised the examination and subsequent survey. His conclusions varied greatly from the results presented by Carson in the 1879 report. According to Carter, the town of Petersburg, Georgia, was a crucial point in the river. There the river received its largest tributary, the Broad River, which at times brought down a volume of water greater than that flowing in the Savannah itself. Petersburg was also the point between Augusta and Andersonville at which the river could be divided into two sections with distinctly different physical characteristics. From Petersburg to the Locks at Augusta, the river flowed over a gentle slope. However, from Petersburg up to Andersonville, the river was a "torrential stream," and in places the tortuous pole-boat channel was only 12 to 15 feet wide. "The velocity

of the currents in these chutes is very great, and any removal of obstructions from the riverbed would only increase this velocity and render upstream navigation even more difficult than it is at present," Carter wrote.[36]

These conditions rendered this upper portion of the river improvable, even for pole boats, only by means of a system of locks and dams that would be prohibitively expensive, costing an estimated $5,200,000. Likewise, the section of the channel from Petersburg to Augusta could be opened for steamboat navigation only through locks and dams providing slackwater navigation. The 1890 *Annual Report* estimated the expense at $2 million. Carter concluded that the amount of commerce that would benefit from those improvements did not justify the cost. According to his statistics, agricultural production in this section of the Savannah River Valley had increased more than 30 percent, but river freights had declined by 67.2 percent. The decline in freight carried on the river, he said, was due to the railroads built in the 1880s. Pole boats simply could not compete with rail transportation, and any improvements in the pole-boat channel would do little to attract the transportation of produce to the river or to regulate railroad freight rates.[37] Thus, Carter recommended a limited project for the river above Augusta.

The Rivers and Harbors Act of 1892 provided for establishing a downstream channel from Petersburg to the Locks 12 to 15 feet wide and navigable during ordinary summer low water for pole boats drawing 2 feet of water. The channel was to be navigable upstream under the same low-water conditions for pole boats drawing 1.3 feet of water. This channel depth was to be achieved by removing logs and overhanging trees; excavating rock, sand, and gravel; using excavated materials to raise the crests of ledges; and constructing training walls to increase the flow of water through sluices.[38] This became the final plan of improvement for this section of the Savannah River, and proved to be one of the least successful in the District. Work was sporadic during the 1890s and, by the end of the decade, the channel was reported to be considerably obstructed and in need of clearing. As of 30 June 1899 the finished works were in fair condition, but some of the training dikes built with the rock excavated from the sluices had been damaged, and part of the rock had washed back into the river.[39] Captain Cassius Gillette reported two years later that the channel still was difficult to navigate and that poling small boats, the only vessels suitable for the waterway, was "laborious." However, the minor improvements thus achieved, he claimed, were very important to the river's use.[40]

Corps activity declined significantly over the next few years but picked up again when contractors were engaged to remove rocks, boulders, and logs and to cut trees along the banks. A small dam was even built at one point to help direct the water's flow. In the meantime, however, Congress jeopardized the future of the project when it authorized the construction of two power dams on the river above Augusta. When the dams were completed, their respective reservoirs drowned part of the river channel under improvement. The Georgia-Carolina Power Company built one of the dams, Stevens Creek Dam, about one mile upriver from the existing dam above Augusta. It had a lock to facilitate river transportation. The fixed power dam at Gregg Shoals was built about 75 miles beyond Augusta but did not include locks.[41] Congress asked the Corps to carry out a new survey and examination along this part of the river to help

determine what, if any, changes would be required. The reports that followed in 1913 and 1916 recommended no new project.[42]

Although never having a high priority on the Corps' list of projects, interest in improvements on the Savannah River above Augusta waned in the post-World War I era as Congress and the Army Engineers focused their attention on the major river and harbor activities of the District. This lack of new work was further justified by the decline in commerce on that part of the river. Earlier in the century cotton, hay, grains, cordwood, fertilizer, and various types of general merchandise were carried regularly by pole boats along this route. The first ten years of the 20th century saw an average commerce of 2,995 short tons of trade valued at $169,780.[43] As late as 1917 pole boats maintained a regular daily schedule between Augusta and the Georgia-Carolina Power Company dam. In addition, timber was rafted down to Augusta. However, low prices for timber and the effects of the boll weevil on the cotton crops of this region caused commerce to decline rapidly in the early 1920s. In fact, the Savannah District office reported no traffic on this project from 1922 to 1930. Accordingly, the Corps ceased to propose any work for the river and requested no further funding. In 1926 Congress was urged to abandon the project, and in 1932 the District officer dropped it from his *Annual Report*.[44]

## SAVANNAH RIVER AT AUGUSTA

Augusta grew up along the fall line, an imaginary line drawn through the points where the various rivers descend over their last rapids or falls down to the coastal plain on their way to the Atlantic Ocean. The city is situated on the Savannah River about 218 miles by water from the river's mouth. The river flows toward the city at a high velocity as it passes out of the Piedmont of northeast Georgia and western South Carolina. The geography of the area and its effects on the river current had long been a problem for Augusta, especially in periods of high rainfall. Sudden and severe freshets, sometimes as high as 35 feet above ordinary low-water levels, brought water roaring toward the city and crashing against the banks of the Savannah River. Augusta was plagued by periodic flooding and particularly by erosion of the soil along the river's edge. Colonel Dan Kingman reported in 1912 that "with every high freshet a loss of bank occurs."[45]

The 1888 Rivers and Harbors Act, which authorized the examination of the Savannah River above Augusta reported on by Lieutenant Carter in 1890, also specified a study of how to protect Augusta from destructive floods. This provision was unique in that traditionally the Corps was charged only with improving river channels for navigation purposes. However, the Savannah River's eroding banks at Augusta created silting and sandbars downstream, resulting in navigational obstructions and "rendering the improvement of the river by regulation almost impossible."[46] Carter's preliminary report of February 1889 was the first official Savannah District response to the question of flood control. The District Engineer and Assistant Engineer George W. Brown performed an extraordinary analysis of the discharge rate of the river during flood stages in order to provide data relative to protecting the city.

Carter first determined the historical characteristics of flood waters in the Savannah River. After comparing the floods of 1796, 1840, 1852, 1865, 1887,









*The Augusta flood of 1888 (3 scenes). (Augusta Photo Company, Richmond County Historical Society)*

and 1888, he concluded that it was conceivable that floods could occur in Augusta that would be approximately 54 percent greater than that of 1888, "the most destructive of life and property ever known in the history of the Savannah River."[47] His report recognized that "it does not lie within the power of man to remove the causes of the destructive floods in the Savannah River Valley, although their evil effects might be lessened by a more careful and rational method of tillage, and by a partial reforestation of the hill sides. Complete relief must, however, be secured by controlling the floods."[48] Carter then evaluated four alternative solutions to dealing with the problem of floods in the Augusta area.

First, the river channel below Augusta could be deepened, thus allowing it to discharge the flood water without overflowing. Carter rejected this idea because of the extent of work and expense involved. Second, additional outlets for the flood water might be provided by extending the Locks Canal to join the river below the city or by cutting a canal on either the Georgia or the South Carolina side of the river. While the amount of work involved in this solution would not be prohibitive, the cost — a minimum of $6 million — would be a definite barrier. Third, the riverbed could be confined by constructing levees around the city. For this solution to be effective, the entire city would have to be enclosed, requiring changes in the sewage system, water lines, railroad lines, and highways. Moreover, the levees would restrict the growth of the city and would fail to protect the riverfront plantations, which had suffered even more damage in 1888 than had Augusta.[49]

The fourth possible solution to the problem was impounding the flood waters in restraining reservoirs in the valley of the upper river so as to regulate the flood discharge. The visionary Carter concluded that this was the only reasonable alternative. He suggested that damming some of the tributaries of the Savannah River, such as the Broad, Seneca, and Tugaloo rivers, would be more effective and "for the sum necessary to protect the city of Augusta by levees the whole river valley could be protected against destructive inundations." He indicated, however, that additional time and money would be needed to determine the practicability and cost of such a reservoir system.[50]

On 26 August 1908 Augusta experienced one of the river's worst floods. As commanding officer of the Savannah District, Colonel Kingman went to the city to investigate the situation. In commenting on the damage to the riverbank, he suggested to the Chief of Engineers that the flooding could be controlled by constructing a levee from the high ground above the city as far downriver as economically possible. He acknowledged that while such levee work would not be within the authority of the federal government, protection of the riverbank did affect river regulation and navigation and thus could be a legitimate responsibility of Congress.[51]

In the 1909 Rivers and Harbors Act, Congress directed the Savannah District to make a survey and examination of the river at Augusta. Although the control of erosion as a result of flooding was the goal, the law couched the study in terms of a "a view to determining what improvements were necessary in the interest of navigation."[52] In reporting on the survey Kingman asserted, "The satisfactory improvement of the river for the first 20 miles below Augusta can only be accomplished...by the protection of the caving banks so as to cut off the




*The 900 block of Broad Street in Augusta during the flood of 26-27 August 1908. (Richmond County Historical Society)*

supply of bar making materials." He added that bank protection was further justified "in the interest of navigation" to make possible the construction of wharves and warehouses along the Augusta riverfront.[53]

Kingman's report recommended riprapping the riverbank adjacent to the city for a distance of 7,900 feet, which Congress authorized in 1910. However, because the project would have some effect on flood control, Congress, still following Kingman's advice, required that the people of Augusta provide one-half of the estimated cost of $250,000.[54] The Savannah District office contracted with Bryan and Company of Jacksonville, Florida, to place several tons of rock in a trench dredged "at the toe of the [bank's] slope," to pave the lower areas of the slope with stone, and to sod the upper regions with grass.[55] The project was completed as of 30 October 1913. The Corps saw evidence of the project's success in March 1912 and again in March 1913 when heavy freshets washed by the city but caused none of the usual erosion.[56]

Even as the contractor was working, Congress called on the Engineers to make another survey to determine what could be done to enlarge and improve



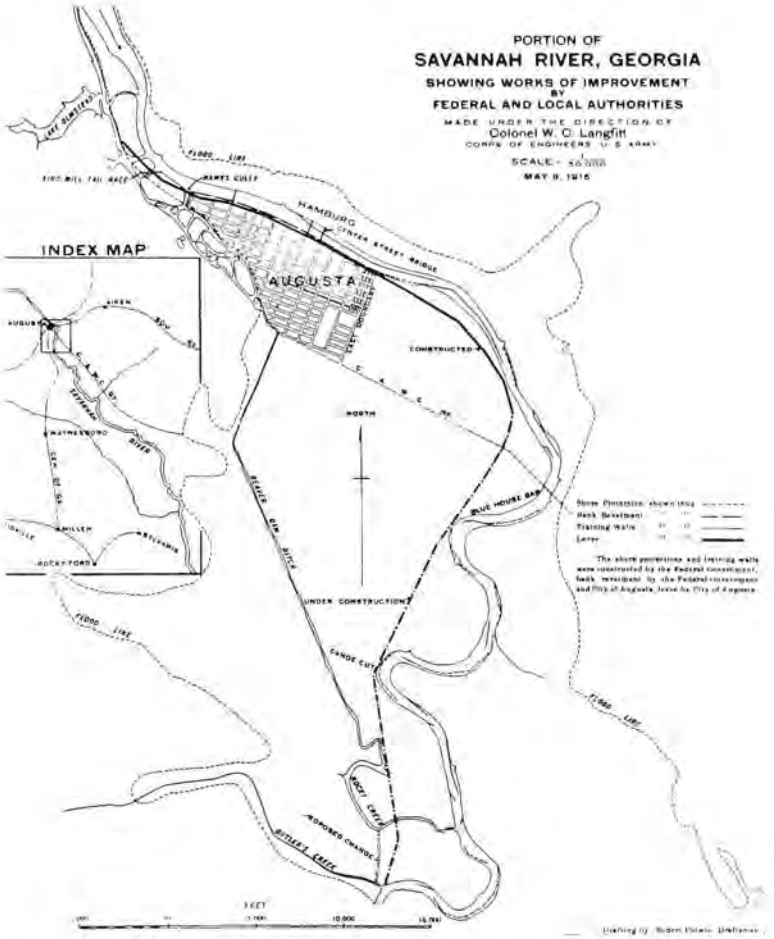
*Bank revetment under construction on the Savannah River at Augusta between Center Street and East Boundary Street c. 1913. This project was carried out by contract with the Corps of Engineers. (Savannh District, Corps of Engineers)*

the project "in the interest of navigation." After directing the survey, Colonel Kingman recommended extending bank protections an additional 3,500 feet. He again suggested that Augusta contribute one-half of the estimated cost, which was $120,000. Following adoption of the new proposal in the 1913 Rivers and Harbors Act, the Corps contracted for the additional bank work with A.J. Twiggs and Sons of Augusta, a company frequently under contract with the Savannah District for work on the Savannah River. This latest activity was completed in September 1915.[57]

The last phase of bank revetment at Augusta resulted from additional congressional funding authorized in 1916. Congress provided $33,000 to pay for extending the project 850 feet downstream. This job was completed in 1918.[58] Except for repairs in 1920 to some of the bank paving damaged by high water, the project required little further attention from the Corps. In 1926 the Corps recommended that the project be dropped from the list of Savannah District projects. This was done in 1932.

While the improvements helped protect the city and the river's banks there from the devastation of flooding and freshets, the Engineers reported success primarily in terms of retarding shoaling problems in the river channel downstream. The bank protection also promoted the construction of permanent terminal facilities at Augusta.[59]

Although the Engineers in Savannah had worked to control bank erosion at Augusta, the Corps was reluctant to get involved in the area of specific flood control measures there. Therefore, the city itself began constructing a levee along the riverbank, which was completed in 1916. Congress then authorized a preliminary examination between the upper city limits and the mouth of Butlers Creek "for the purpose of ascertaining the effect upon navigation of the river




*Map showing works of improvement along the Savannah River at and below Augusta done by local and federal governments as of 8 May 1915. Caption to the map states that the shore protections and training walls were constructed by the federal government; bank revetments were constructed by the federal government and the Augusta city government, and the levee was constructed by the City of Augusta. Note the location of the Augusta Canal and the Canoe Cut on the river below Augusta. (H. Doc. No. 615, 64th Cong., 1st Sess.)*

of the flood-protection work now being constructed and maintained by local authorities, and to further ascertain the probable cost and value of the extension of such work over such territory."[60]

In the reports that followed, Edgerton C. Garvin, who was the Assistant Engineer in charge of the survey, Savannah District Officer Colonel William C. Langfitt, and the Board of Engineers for Rivers and Harbors all recommended against any Corps project. Garvin declared that the levee would "have too slight a beneficial effect, in the interest of navigation, upon the Savannah River to warrant the Federal Government to assume any portion of the work now being constructed."[61] Speaking for the Board of Engineers, Colonel William H. Black wrote that "the interests of commerce and navigation are so remotely connected with this improvement, that it should not be undertaken by the United States."[62] Dan Kingman, who as District Engineer a few years earlier had given so much attention to the Augusta situation, was now Chief of Engineers. His new position required that he view the city's flood problem from a broader perspective. Writing to the Secretary of War he said, "I fully recognize the very great value and importance to the city of Augusta of thoroughly protecting the river bank to the top of the levee; nevertheless I am forced to concur in the views of the Board..."[63]

Congress yielded to the Engineers' advice, but in the 1917 Rivers and Harbors Act it required the Engineers to do yet another survey. This study was to determine the extent of erosion, the efforts required to prevent it in the interests of navigation, and the level of cooperation that could be expected from local interests. Again the Corps advised against a project that would not have "any direct beneficial relation to navigation." Colonel John Millis rather emphatically declared, "I think I should add that this is the third report that has been made on what is essentially the same subject, and that the conclusion is not likely to be modified by further repetitions of the examination."[64]

The situation at Augusta vis-a-vis the Savannah River thus reflected the Corps' limited vision well into the 20th century concerning waterways development for other than navigational benefits. The primary responsibility for protecting the city from river flooding continued to reside with Augusta's citizens. After the disastrous flood of 1929 damaged the levee and seriously threatened the city, Augusta's civic leaders began raising the levee in the early 1930s, aided eventually by New Deal emergency appropriations and the Works Progress Administration.

In May 1933 District Engineer Major Creswell Garlington submitted his 308 report on the entire Savannah River Basin according to the specifications of House Document 308, 69th Congress, 1st session, which were included in the Rivers and Harbors Act of 1927. In this act Congress had required the Corps to investigate the existing and prospective development on the Savannah River for navigation, power, flood control, and irrigation. Congress evidently was beginning to respond to an emerging national interest in multipurpose river basin development. However, the Corps of Engineers, including Garlington and Brigadier General George B. Pillsbury, then Acting Chief of Engineers, again advised against any kind of U.S. government flood control activity on this waterway.

Garlington maintained that there was no flood problem "of importance"



*Creswell Garlington, Savannah District Engineer from 1932 to 1936. (Savannah District, Corps of Engineers)*

anywhere along the river except at Augusta, and that local interests were undertaking adequate flood control protection there. He also rejected any claim that flood control efforts could benefit navigation or be coordinated with power development as some supporters had suggested. Moreover, the District Engineer declared that the river valley needed no aid to irrigation and that the navigation channel as currently authorized was sufficient, thus nullifying improvement proposals beyond the lock and dam project at New Savannah Bluff. Finally, he reported that no market yet existed for electric power generated by dams constructed on the Savannah River, although the river possessed some good potential sites for power dams in addition to those already built. He cited specifically high dam sites at Clark Hill and Hartwell, upriver from Augusta, two locations that would receive much attention in the coming years. Garlington concluded that the federal government was not justified as yet in supporting hydroelectric power production on the Savannah River. He conceded, however, that at some future time coordinating navigation improvements and construction of dams for power generation might be warranted.[65]

Congress finally passed a flood control act on 22 June 1936, which estab-




*Contract workers paving the riverside slope of the Augusta Levee with stone, 2 November 1938. Compare the levee in this picture with that in the 1915 picture of the same area. (Savannah District, Corps of Engineers)*



*Sibley Mill Gates on the Augusta Levee as of 26 October 1939 and prior to improvement. (Savannah District, Corps of Engineers)*

lished "for the first time in the history of the Federal Government, a definite flood control policy which provides for its participation in the construction of economically justified flood-control projects..."[66] As the traditional construction arm of Congress in river and harbor projects, the Corps of Engineers finally was drawn into full-scale flood control activities in the United States, and the Savannah District would have to reassess the problems at Augusta. The project for Augusta, specified by this law, called for enlarging the existing levee both in height and width as well as raising and strengthening six floodgate structures in the levee, constructing retaining walls, and, where necessary, paving riverside slopes such as that at Canoe Cut, a long-time problem area. The Savannah Engineers were to make the necessary surveys and draw up the plans and specifications. The actual construction was carried out under contract over three years beginning in March 1938, although some work was done with government plant and hired labor. After the project was completed, the Corps of Engineers turned it over to local interests on 6 June 1941 for maintenance.[67]

In addition to providing for flood control activities at specified places such as Augusta, the 1936 act called on the Army Engineers to further study and report on some locations that appeared to have potential for "useful flood-control operations with economical development of hydroelectric power whenever markets to absorb such power become available." One site named in the law was that of the future Clark Hill Reservoir on the Savannah River above Augusta.[68]



*Sibley Mill Gates on the Augusta Levee as of 16 October 1940 following raising and strengthening of Wannamaker and Wells, Incorporated, under contract with the Corps of Engineers. (Savannah District, Corps of Engineers)*



*Raymond F. Fowler, Savannah District Engineers from 1936 to 1940. (Savannah District, Corps of Engineers)*

Local interests had continued to push for a dam there in spite of the objections in the 308 report. This time the Corps responded positively at all levels. Lieutenant Colonel Raymond F. Fowler, Savannah District Engineer in 1938, recommended building the dam. Hydroelectric power generation was emphasized as the principal benefit, with navigation on the Savannah River through regulation of sufficient water level taking second place. Fowler did not believe that flood control costs associated with the dam would be justified economically, but he conceded that some flood control would result from the power project. The District Engineer also referred to recreation benefits, a factor that would become more important in the future. The Board of Engineers for Rivers and Harbors and the Chief of Engineers, Major General Julian L. Schley, endorsed Fowler's recommendations.[69] The stage was set for one of Savannah District's most monumental undertakings, but the ensuing war years would postpone the new project for some time.

# 6 THE ALTAMAHA SYSTEM

In the late 19th and early 20th centuries, the Corps' civil work focused almost exclusively on river and harbor development, emphasizing transportation and navigation improvements. Except for Savannah Harbor, considered one of the more important East Coast ports, and perhaps Brunswick Harbor, which was seeking to challenge her rival to the north, the Savannah District projects tended to be closely allied with the needs of the people of that area. Also, projects tended to be dealt with individually rather than as part of a comprehensive plan. And although Congress authorized and funded the projects in a way that fostered this approach, the Corps likewise exhibited a limited vision. A prime example was the improvements to the so-called Altamaha system, which is composed of three rivers: the Altamaha, the Oconee, and the Ocmulgee.

In terms of commerce and navigation, the Altamaha River is perhaps the most important river lying entirely within the State of Georgia. It begins at the confluence of the Oconee and the Ocmulgee rivers, known as The Forks, about 131 miles above the coastal town of Darien. From there the Altamaha flows southeast to the Atlantic Ocean. About 25 miles from the ocean, the river branches and empties into the Atlantic via Sapelo, Doboy, Altamaha, and St. Simons sounds. This river, with the Oconee and the Ocmulgee and their respective tributaries, drains an area of approximately 14,620 square miles, a sizable portion of Georgia.[1] The Altamaha Valley proper covers approximately 3,000 square miles and is a low, undulating region with a sandy, permeable soil. For this reason, it was estimated in 1890 that probably no more than 20 percent of the rainfall in the area finds its way into the river.[2] Most of the water in the river is brought down by its tributaries from the clay hills of central and north Georgia.

The source of the Ocmulgee River is found in the confluence of the South and Yellow rivers, about 20 miles below Covington, Georgia. The Ocmulgee flows southeast for about 350 miles to a point where it joins the Oconee River to form the Altamaha. From Covington to Macon, the river falls so rapidly that it has been considered unnavigable. Macon, therefore, has been considered the head of navigation in the projects of improvement for this river.[3] Below Macon the river runs through a low, heavily timbered country and is bordered by swamps from one-half to three miles wide. The soil along the banks consists of alluvial deposits and is easily eroded. The channel, which is generally tortuous and



*A 1913 map showing the lower reaches of the Altamaha River and how it branches before flowing into Sapelo, Doboy, Altamaha, and St. Simons Sounds and emptying into the Atlantic Ocean. (Savannah District, Corps of Engineers)*

shifting, has been subject to considerable obstructions such as snags, overhanging trees, and sand and gravel bars.[4]

The Oconee River rises in the northeastern part of Georgia and flows southeast to the point where it unites with the Ocmulgee, a distance of approximately 300 miles. The characteristics of this waterway and the terrain through which it flows are similar to those of the Ocmulgee River. The Ocmulgee is the larger of the two tributaries and, in the past, has been considered relatively more valuable and suitable for improvement. However, in the 19th century the country bordering the Oconee was less accessible to railroads and therefore more dependent on the river as an outlet for its products. The economic progress of this region was retarded somewhat by the uncertainty of shipments due to the varying conditions of the river channel.

Congress first appropriated funds for Corps' work on the rivers as early as the late 1870s. The projects on these rivers that would dominate the work of the Corps of Engineers for a little more than two decades were adopted by the Rivers and Harbors Act of 1890.[5] Improvements on all three rivers were considered as separate projects until the three were consolidated into one project by the Rivers and Harbors Act of 1907.

## ALTAMAHA RIVER

In 1887 a large section of the State that was drained by the Altamaha and its tributaries had no outlet for its projects other than this river. Improving its navigability would reduce the costs of transportation and increase the economic

development of the drainage area, especially for trade in timber, naval stores, and rice.[6] The Altamaha River was thought to be "of additional importance when considered as the eastern branch of the proposed Southern transportation route, connecting the Mississippi River at Paducah, by way of the Tennessee and Ocmulgee Rivers, with the Atlantic Ocean."[7] This idea had been formulated by an act of Congress in March 1871.[8]

Section 2 of the Rivers and Harbors Act of 1880 provided for an examination of the Altamaha River with estimates of the cost of works of improvement.[9] Colonel Quincy A. Gillmore was responsible for the study, which was carried out by W.G. Williamson. Gillmore's November 1880 report formed the basis for the first Altamaha River improvement project, which was approved in the Rivers and Harbors Act of 1881.[10] The work was to provide a navigable river channel 80 feet wide and 3 feet deep at low water and was to be accomplished by removing major obstructions in the river, which included rock ledges, sandbars, snags, an old wreck in the upper portion near The Forks, and pilings that were driven in the channel during the Civil War.[11]

In the first appropriation of funds, $5,000 was spent for the services of the snagboat *Toccoa*. The boat began work in 1883 and operated intermittently as funds were available. In 1887 Gillmore reported that the *Toccoa* had removed obstructions from the numerous bends and reaches from Darien to a point about 115 miles upriver.[12]



*The U.S. snagboat* Toccoa *used by the Savannah District of the Corps of Engineers on the rivers of the Altamaha System as well as the Savannah River. n.d. (Georgia Department of Archives and History)*

Working under the direction of Lieutenant Carter, Arthur S. Cooper, Assistant Engineer, surveyed the river in 1888 and 1889. The results of this survey formed the basis for a revised project of improvement.[13] The survey established the distance of the river from The Forks to the town of Darien via the channel as 131 miles rather than the 155 miles that had been reported earlier. Carter



*A May 1914 view of an earlier closing dam built by the Corps of Engineers at Jacks Suck, a cut off across an oxbow of the Altamaha River, as seen from the down stream side. (Savannah District, Corps of Engineers)*

asserted that the incorrect distance had probably been obtained "from the river pilots who invariably overstate distance."[14] The plan of improvement established in the report and subsequently approved by Congress called for creating a navigable steamboat channel 3 feet deep at ordinary summer low water between the junction of the Oconee and Ocmulgee rivers and the town of Darien. This was accomplished by removing rock shoals and sandbars, building deflecting dikes, closing incipient cutoffs, removing snags and logs from the channel and overhanging trees from the riverbank, and revetting caving banks.[15] In 1897 and again in 1899, these works were reported to be in good condition. Snags had continued to collect in the channel, but were removed as soon as the water level permitted and funds were available.[16]

Over the next 10 years, much time and money were spent on repairs to earlier structures and on maintaining work already completed. High water, a common problem that was particularly bad in 1900 and 1901, posed serious problems. Freshets in the upper sections of the river raised the level as much as 20 feet above summer low water, and the high water brought new logs and snags. Nevertheless, by 30 June 1910, the Altamaha River project was 90 percent complete.[17]

## OCMULGEE RIVER

Prior to the Civil War, Georgia periodically tried to improve navigation on the Ocmulgee, with very few lasting results. In 1852 Congress ordered an examination of the river, but appropriated no funds for improvement. An 1871 act of Congress ordered a survey for a "line of water communication between the Mississippi River and Atlantic Ocean by way of...Ocmulgee River."[18] This inclusion of the Ocmulgee River in a cross-country water transportation system led to an 1874 appropriation for a survey of the "southern route," which

contemplated the use of the Ocmulgee.[19] An 1875 examination of costs called for a channel 80 feet wide by 4 feet deep at extreme low water from Macon to the river's mouth 202 miles downstream. The project was approved, and the first appropriation for improvements was made in August 1876.[20] The Corps subsequently began work toward establishing the channel as previously recommended from Macon to The Forks. This included removing rock shoals and sandbars by dredging and removing snags and logs from the channel and overhanging trees from the banks of the stream.[21]

In 1875 Congress provided for an examination of the Ocmulgee River from Macon to Covington, a distance of about 60 miles. According to the report of Major Walter McFarland, the Engineer charged with making the examination, this section of the river was 50 to 120 yards wide and very crooked and full of obstructions. He estimated at least 60 obstructions between the two cities, or about one every mile and a water depth over these obstructions of 12 to 24 inches at low water.



*Construction on the Ocmulgee River in Bibb County, Georgia, near Macon in December 1898. Note the boulders and rock shoals characteristic of the river in this area of Georgia. (Georgia Department of Archives and History)*

McFarland stated that a system of locks and dams would cost "not much less than $2,000,000" and would benefit only those few counties bordering the river.[22] McFarland felt that only if the river were an integral part of the system of inland transportation contemplated in 1871 would such enormous expenditures be justified. When that idea was eventually abandoned, improving the Ocmulgee above Macon was no longer considered.

Assistant Engineer F.C. Armstrong submitted an extensive report on the Ocmulgee in 1889. He remarked that many of the complaints about the shallow water were due to the existence of snags near the banks, which kept boats away from the deepest water in the bights. He recommended that these snags be removed and used to form spur dikes on the opposite shore. He went on to say that, if this action failed to remedy the problem, "a system of spur dikes should be built to form contracting works."[23] Apparently, the idea was rejected. In a revised improvement plan, submitted by Carter in February 1890, a navigable steamboat channel 3 feet deep at ordinary summer low water was to be established from Macon to the river's mouth by removing the rock shoals and sandbars, closing the incipient cutoffs, revetting the caving banks, and removing snags and logs from the channel and overhanging trees from the banks.[24] Congress approved this plan in the 1890 Rivers and Harbors Act.[25]

Armstrong's 1889 report describing the dynamics of the Ocmulgee River's evolution also explained the characteristics of other rivers in the Southeast:

> The river at Macon is 273 feet above mean low tide of the Atlantic, and in a direct line the distance is about 165 miles. The effect of this fall in the given distance would be to create a current greater than the material composing the bed would stand without erosion, and in order to produce equilibrium by decreasing the fall per mile, the distance must be increased, and this has caused the river to take its present narrow, tortuous form, resembling a series of loops, which has increased the distance to some 450 miles. As the current continues to erode the banks in the bends, or bights, of the river, the loops become larger and the current becomes more sluggish. The eventual result is the formation of a slough or cut-off across the point of land or bar of the loop. These cut-offs are invariably troublesome to boats and require time and considerable work with the snagboat to make navigable. These sloughs should all be closed unless the river is to be assisted in making the probable cut-off, but the preferable plan would be to prevent them.[26]

Of the three rivers in the Altamaha system, the Ocmulgee was reported in the early 1900s to be in the best condition overall. The 1901 *Annual Report* described "significant improvements;" and the 1902 report proclaimed the river to be in "first class condition" over the first 93 miles of channel.[27] Generally, in those years steamboats went no farther upriver than Hawkinsville. The controlling depth had been achieved to that point as a result of the Corps' snagging efforts, stump removal, and cutting of overhanging trees. Moreover, the Engineers also began building training dikes to help remove shoals and bars in various locations. Some rock shoals, however, continued to make navigation difficult near Hawkinsville.

The Corps started giving more attention to the section of the river between Hawkinsville and Macon, where the principal natural obstacles to navigation were the heavy rock shoals above Hawkinsville and long sand shoals below Macon. Training walls and a spur dam were built to remove the sandbars near Macon, but high water and frequent freshets plagued the improvement efforts. Collapsing of riverbanks frequently caused new sandbars and altered the channel. The condition also damaged dikes, dams, and other regulating structures. Eroding riverbanks became such a problem that Congress authorized spending $5,000, one-third of the Ocmulgee appropriation in the Rivers and Harbors Act

of 1905, for maintenance and repair "of shore protection dikes and training walls."[28]

The Corps considered that the Ocmulgee project was "technically accom-



*The steamboat* Swan *loading cargo at Hawkinsville on the Ocmulgee River in 1905. (Ruby Rahn Collection, Coastal Heritage Society)*



*A training wall built by the Corps of Engineers on the Ocmulgee River at Macon as seen in 1910. (Savannah District, Corps of Engineers)*

plished" as of 30 June 1910. However, the Engineers conceded that there was still work to be done, especially between Macon and Hawkinsville. The creation of a channel according to project specifications had been achieved from The Forks to a point 45 miles below Macon, and from that point to Macon, the controlling depth was about 2.5 feet at ordinary summer low water. In some places the river channel was still narrow and crooked enough to make navigation difficult, however.[29] Also, the usual maintenance work of removing snags and stumps from the channel, cutting overhanging trees on the banks, and repairing dikes, training walls, and other structures remained.

## OCONEE RIVER

The Savannah District faced problems on the Oconee River similar to those on the Altamaha and Ocmulgee rivers, though perhaps worse. Following instructions from Congress, Gillmore in 1874 directed an examination of the Oconee River from Milledgeville to the river's mouth. The first plan of improvement was submitted in 1875, and it called for securing a low-water channel 3 feet deep. In 1878 Congress appropriated money for this work. When the original cost estimate was found to be inadequate, the project was revised, and the estimate increased in 1880 and again in 1888.[30]

The 1878 project considered Milledgeville to be the head of navigation, but an act of Congress in August 1886 appropriated funds for improving a section of the river 54 miles above Milledgeville.[31] This 18-mile segment was to be improved for the benefit of local interests; the apparent reason was to cut transportation costs from a cotton mill downstream to the bridge where the Georgia Railroad crossed the river.[32] The 54 miles of the river between this bridge and Milledgeville were so obstructed by shoals and rapids that the expense of building locks and dams to improve navigation was considered to be greater than any possible advantage to be derived from the improvement.

Dublin was the actual head of navigation on the Oconee, for a railroad bridge 28 miles above the city barred passage to the remaining sections of the river between that point and Milledgeville. The condition of this section of the Oconee was relatively unknown in 1890 because the railroad bridge, built in 1840, contained no draw mechanism. As a consequence, no improvement could be undertaken. The 1875 *Annual Report* had noted, however, that at extreme low water in this section, 2 to 2.5 feet was the shallowest depth, and usually depths of 4 feet could be obtained.[33]

As a result of the conditions on the upper reaches of the river, the appropriations for improving navigation in the 1880's were applied principally to the section between the railroad bridge and Dublin. This work was to provide an outlet for the commerce above Dublin, which, until river transportation was improved, depended on a 26-mile haul by wagons over poor roads. After 1890, however, rail lines were extended into Dublin, an action which nullified further improvement of the river between the town and the railroad bridge. Appropriations were then spent on improving the 110-mile stretch of river between Dublin and its mouth.

The Rivers and Harbors Act of 1888 called for a survey of the Oconee River to determine a revised project of improvement.[34] Lieutenant Carter's subsequent report concluded that the Oconee River warranted improvement all the

way to Milledgeville for a navigable channel 3 feet deep at ordinary summer low water. The District Engineer called for the usual removal of rock shoals, sandbars, snags, and logs from the channel and overhanging trees from the banks, as well as enlarging portions of the river, revetting caving banks, and closing incipient cutoffs.[35] Congress approved the project in 1890.[36] By 1897 work had progressed to the extent that the Engineer reported the channel was in good condition and the river was navigable from the mouth to Milledgeville, a distance of about 147 miles.

Despite the Corps' activities during the 1890's, the natural conditions along the Oconee posed constant problems that often received inadequate attention. In the early 20th century, the Corps was reporting that the river channel was in poor condition. Snags and logs continuously obstructed navigation. As in the case of the Altamaha, high water in the early 1900's created new snag problems on the Oconee, and every year the Corps' laborers worked to remove obstructions as well as to extend the improvement. The work also continued to include cutting trees on the banks, removing sandbars and rock shoals, opening and closing cutoffs, repairing earlier improvements, building shore protections, and constructing one spur dam and six training dikes, all by 1910.[37] Early in the decade "an injurious cut off" was developing on the river at a place called Bonny Clabber, and the Corps built a training dike there to help remove a sandbar and deepen the channel.[38] While the approved project on the Oconee was considered approximately 90 percent complete by June 1910, the channel was still "very crooked and too narrow for easy navigation."[39]

During this same period, the Corps gave renewed attention to the section of the river above Milledgeville from the Georgia Railroad bridge, 54 miles above



*The channel through Carr Shoal on the Oconee River in 1910 as improved by the Corps of Engineers. This shoal was considered one of the worst on all three rivers of the Altamaha System. Note the overhanging trees on the banks, always a potential source of snags in the river, and the snagboat and derrick boat moving through the channel. (Savannah District, Corps of Engineers)*

the city, to the northern boundary of Greene County. The Rivers and Harbors Act of 1905 authorized spending $3,000 to clear hazards from that part of the river, but the waterway between Milledgeville and the bridge was still considered unsuited for improvement except by an expensive system of locks and dams.[40] The Corps again concentrated on removing snags and stumps as well as cutting overhanging trees and removing some rock shoals. Five spur dams were also placed in the river in this region to help restrict the width of the river. By mid-1907, this part of the river was navigable at or above ordinary summer stage, but lack of funds prevented further work there in the next several years.[41]

## THE CONSOLIDATED PROJECT

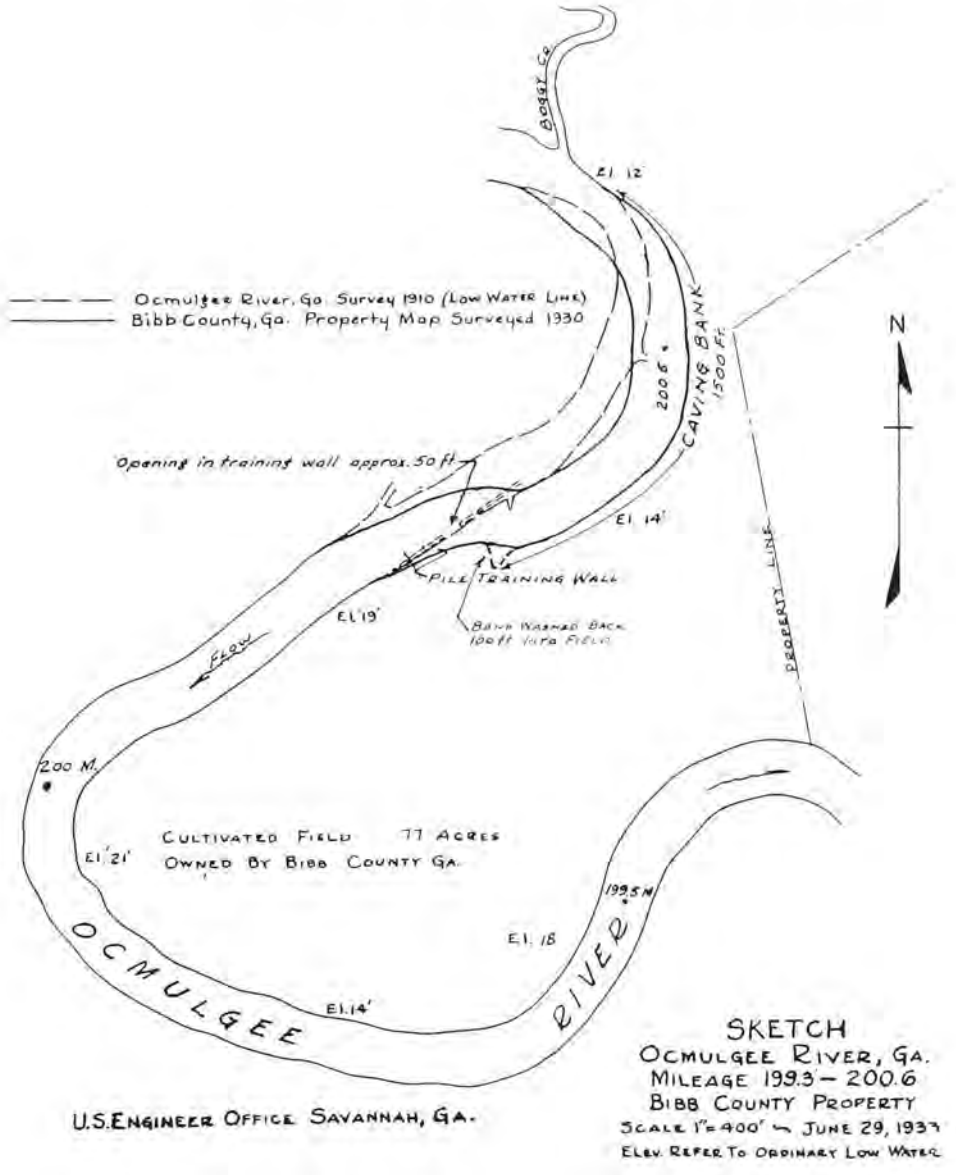
While the three rivers were combined into a single project by congressional legislation in 1907, not until 1912 did this consolidation become noteworthy. The 1909 Rivers and Harbors Act called for a new survey of the entire Altamaha River system. In the preliminary examination, Colonel Dan Kingman recommended that a full survey for a channel 4 feet deep be carried out. Despite opposition from the Board of Engineers for Rivers and Harbors to expanding the project's size on the grounds that the current 3-foot channel did not always contain sufficient water levels, in July 1911 Kingman submitted a full report on the three rivers. He expressed his belief in the continued economic value of the Altamaha system and recommended additional improvement.

Congress answered with an appropriation in the 1912 Rivers and Harbors Act, to be divided among the three rivers.[42] The money was to be used to



*The earlier closing dam at Jacks Suck on the Altamaha River was replaced by a rock closing dam completed by the Corps of Engineers in 1916. Note the remains of the original closing dam. The main channel of the Altamaha River is seen to the right looking upstream, and Jacks Suck is to the left of this photograph taken 28 April 1916. A snagboat can be seen beyond the closing dam. (Savannah District, Corps of Engineers)*

maintain a waterway 3 feet deep at summer low water all the way to Macon and Milledgeville in accordance with the 1890 project plans. In addition, some funds would be used to deepen the channel up to 4 feet when possible. The data collected by the Corps showed that some information from the original survey was not correct and that the controlling depths were actually lower than previously believed because the old 1890 datum plane was about 1 foot too high. Thus, the plans for the original project "were not sufficient to afford the low water depth desired," and further deepening in a few localities was necessary.[43]




***A Corps of Engineers sketch of the Ocmulgee River near Macon showing the effects of the river current on caving banks between 1910 and 1930. (Savannah District, Corps of Engineers)***

Up until the time of World War II, most of the Corps' work on these three rivers was devoted to maintenance and repairs. Year after year the District office and the Chief of Engineers reported on snagging and dredging operations as well as repairs to existing structures. *Annual Reports* from 1914 to 1939 reveal that 1913 was the last year the Corps spent money for new work on the Altamaha River; 1915 was the last year for new work on the Oconee River, and 1917 was the last year for new improvements on the Ocmulgee River. Regarding the condition of the project at the end of each fiscal year, the usual *Annual Report* comment was, "The project is of such a nature that the percentage of completion can not be stated."

The 1912 project would never be declared completed. Unfortunately, maintenance work by the Corps could not preserve the depths of the channels over the years. For example, the 1916 *Annual Report* stated that as of 30 June 1915 the controlling depth "on the Altamaha River at ordinary low water was 3 feet, on the Oconee to Dublin it was 3 feet with 2 feet above that town, and on the Ocmulgee it was 3 feet from The Forks to Hawkinsville, and 2 feet from that point to Macon."[44] In 1928 the Chief of Engineers declared that the controlling depths at ordinary summer low water were "about 1.5 feet for the Altamaha, 1 foot from the mouth of the Oconee to Milledgeville, Ga., and 1.5 feet from the mouth of the Ocmulgee River to Macon, Ga."[45]

All of the Corps' work on the Altamaha system from 1900 to World War II was done by hired day labor using government plant. Late in the 19th century, the government had stopped relying on contract work. The Rivers and Harbors Act of 1900 allowed the Savannah District office to choose how to carry out the work on the Ocmulgee River. As a result, the Corps employed hired labor using government plant and materials purchased by the government.[46] The Corps took the same approach for projects on the Oconee and Ocmulgee rivers, which the District Engineer in 1905 claimed was most "economical" and "advantageous" to the Federal Government.[47] Portions of the funds appropriated for these rivers, both individually and then collectively, were devoted to operating and repairing government-owned vessels as well as to building or renting some of these craft. Notable for their part in Corps' activities on these rivers were the derrick boat *Sapelo*; the snagboats *Tugaloo, Satilla, Oconee,* and *Macon No. 1* and *No. 2*; and the pipeline dredge *Macon*. The Savannah District office also built several barges and flatboats to haul materials and carry shacks used as workers' quarters.

Because the Corps was concerned mainly with improvement for navigation purposes, the justification for expending money and effort was tied to local commerce. During the 1890's an immense business in lumber and naval stores developed in the regions bordering these rivers. It was anticipated that as the timber resources were depleted and the activity of the naval stores and lumber businesses declined, a rich farming country would be opened up and the cotton and grain raised on this land would have to be transported to markets via the river. Lieutenant Carter predicted in 1890 that, if the Oconee and Ocmulgee rivers were ever opened up to navigation as far as Milledgeville and Macon and a low-water channel 3 feet deep were maintained on all three rivers, the commerce on the Altamaha would probably triple within a short time.[48]

Early in the 20th century, cotton proved to be an important commodity




*The U.S. snagboat* Tugaloo *in 1915. It was used on the rivers of the Altamaha System and the Savannah River in the early 20th century. (Savannah District, Corps of Engineers)*



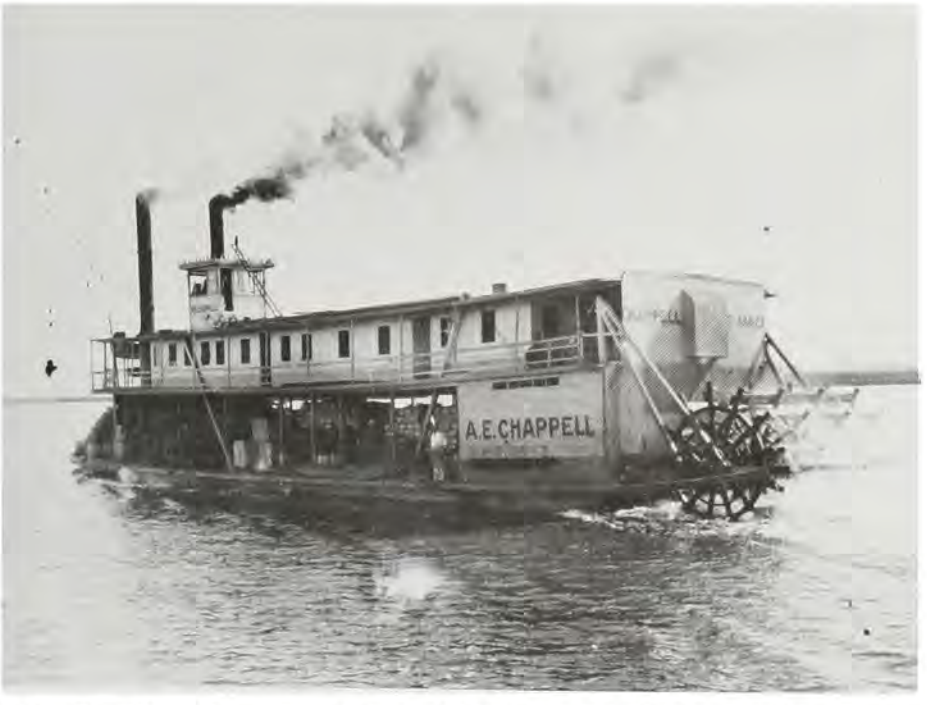
*The U.S. snagboat* Oconee *was also used in the various rivers of the Savannah District in the early years of the 20th century. n.d. (Ruby Rahn Collection, Coastal Heritage Society)*



*The U.S. pipeline dredge* Macon, *seen here in November 1921, was part of the government plant used in the improvement of the rivers of the Altamaha System. (Savannah District, Corps of Engineers)*

passing over the Oconee and Ocmulgee rivers and, to some degree, the Altamaha. Cottonseed meal, fertilizer, and "general merchandise" also were listed as traveling on these rivers. As Georgia's cotton production reached its peak about 1911 and then began to decline in the 1920's and again during the Depression, the transportation of this commodity on the rivers declined.[49] As of the end of 1930, wood products amounted to 99 percent of the total tonnage of commerce on the Altamaha, and the entire commerce of the Oconee and Ocmulgee rivers consisted of wood products.[50]

Generally, timber was the only commodity to pass over the full extent or even the greater part of a river's improved area. Much of the timber associated with the Altamaha River originated on its tributaries and was floated down to Darien or on to Brunswick. Most of the other items passed over only parts of the river. In the case of the Oconee, except for the timber traffic, the commerce was carried over detached segments of the river served by the railroads crossing the river.[51] The Engineers reported that almost all shipping on the Ocmulgee was done over individual sections of the river, with only a few trips being made all the way from Macon to the coast.[52] Steamers usually served only a single section of a river such as between The Forks and Macon on the Ocmulgee or between Doctortown and The Forks on the Altamaha, although a few provided regular service between Macon and Brunswick at certain times of the year. Because of the reduction in commerce on these three rivers during the 1930's, Corps' activity declined, resulting in only maintenance work being done. The improvement of these rivers waned in importance as other activities took precedence in the District.

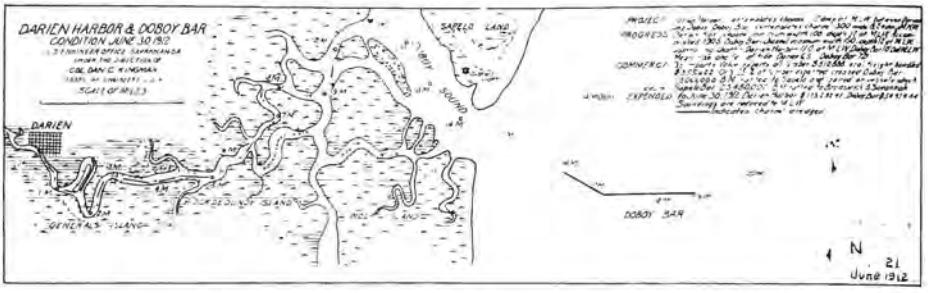



*The steamboat* A.E. Chappell, *photographed in Brunswick Harbor c. 1900, travelled between Macon and Brunswick via the Intracoastal Waterway, the Altamaha River, and the Ocmulgee River. (C.S. Tait, Sr. Collection, Brunswick, Georgia)*

In fact, the Corps gave a negative 308 report on the Altamaha system in 1934. As in the case of the Savannah River Basin, Congress called on the Corps to do a survey, under authority of the 1927 Rivers and Harbors Act, of the Altamaha, Oconee, and Ocmulgee rivers to determine their potential for navigation enhancement, flood control, hydroelectric power, and irrigation. Major Creswell Garlington as District Engineer declared that there was no need to develop irrigation potential in this part of Georgia and that general flood protection and water-power development were economically unjustified. Moreover, he recommended against any Federal improvement work beyond the current maintenance snagging and bank clearing. The South Atlantic Division Engineer, the Board of Engineers for Rivers and Harbors, and the Chief of Engineers all agreed with Garlington.[53]

## DARIEN HARBOR AND DOBOY BAR

The Darien Harbor project was one of the smaller, more limited Corps of Engineers' projects carried out by the Savannah District in the late 19th and early 20th centuries. The improvement was closely connected with the improvement of the Altamaha, Ocmulgee, and Oconee rivers, for its principal value lay in its serving as a shipping point for lumber and timber coming down the Altamaha system. It was the natural outlet for the pine-forest products of at least 19 Georgia counties touched by the rivers. The harbor actually comprises the lower portion of the Darien River, which itself is the northern branch of the Altamaha River from Darien to Doboy Sound, a distance of approximately 12




*Map of Darien Harbor and Doboy Sound done under the direction of Colonel Dan Kingman, dated 30 June 1912. (Savannah District, Corps of Engineers)*

miles. The Darien River offered the best navigable channel of all the outlets of the Altamaha to the sea, and the river commerce used it almost exclusively.

Before the Corps began its improvement work, the harbor was obstructed in seven places by shoals where the mean low water ranged from 6.4 to 10.6 feet, while the rest of the harbor had a minimum mean low-water depth of 12 feet.[54] An 1878 act of Congress appropriated $8,000 for improving the channel in the Darien River without the benefit of a prior examination or survey. This appropriation, the first ever made for this locality, was spent in contracting for dredging work at several points in order to provide a channel 50 feet wide and 10 feet deep at mean low water. The work was completed between December 1878 and April 1879.[55]

The 1884 Rivers and Harbors Act provided for a preliminary examination of Darien Harbor and the Altamaha River from Darien to its mouth.[56] This examination was directed by Colonel Gillmore and carried out by Lieutenant Thomas N. Bailey, Assistant Engineer. The report concluded that there was no significant commerce on the southerly or "Altamaha" branch of the river flowing through Altamaha Sound. Therefore, this section was not recommended for improvement. Moreover, the 1878 and 1879 improvements to the Darien River were found to have deteriorated somewhat, and several shoals still obstructed navigation between Darien and Doboy Sound. The examination further showed that the existing channel across Doboy Bar was filling up and a new channel was forming northwest of the old one. However, the Engineers went on to recommend a survey of Darien Harbor all the way to the ocean and an examination of the crossing at Doboy Bar. They cited Darien's value as a point of shipment for timber and wood products as justification for improving the harbor.[57]

A subsequent survey was conducted in 1884. Colonel Gillmore reported on this study in January 1885 and proposed a project for improving the channel. He called for the removal of the seven shoals between Darien and Doboy by dredging to a minimum depth of 12.5 feet and the construction of wing dams at five of these shoals for maintaining the depth of the improved channel. The intended results of these improvements would be to establish a continuous navigable channel with a minimum low-water depth of not less than 12 feet. These works would increase the available mean high-water depth to 18 or 19 feet and allow vessels of corresponding draught to pass out of the harbor and over

the bar on the same tide.[58] Congress finally approved the Gillmore proposal in 1890. The project did not specify the channel width, but the Corps presumed it should be 150 feet.[59]

The Corps began the project in 1891, and between 1893 and 1895 wing dams were constructed and dredging was done. However, within a decade it became apparent that, because the wing dams were not properly constructed, they had little effect on protecting the channel depth, and the Corps decided that dredging was the key to maintaining the harbor's depth.[60] The P. Sanford Ross Company (Incorporated) of New Jersey did the dredging by contract, and by June 1905 the project depth of 12 feet mean low water had been achieved from Darien to Doboy Bar. In the meantime, the Corps used day labor and government plant to repair and extend the wing dams despite the earlier conclusions regarding their ineffectiveness.[61]

Over the next 5 years, no work was done on Darien Harbor, but the need for maintenance dredging quickly became apparent. Within less than a year after the project had been declared completed, shoaling in two or three places reduced the controlling depth to 11 feet. By 1910 the depth was no more than 10 feet at mean low water in some places. Lack of funds prevented the Corps from doing any work during this time, but in the summer of 1911, the Savannah District again contracted with the Ross Company to dredge and restore the project depth. The 12-foot depth was restored in 1912, but for a channel width of only 80 feet because of inadequate funding.[62]

Since Doboy Bar is the nearest entrance from the ocean into Darien Harbor, it was very important. For several years, however, improvements at these two sites were treated as separate projects. The first appropriation for work to be done at Doboy Bar was provided in the Rivers and Harbors Act of 1886.[63] The same act provided for a survey from Doboy Island, situated at the mouth of Darien River about 12 miles below the town of Darien, to Doboy Bar.[64]

Doboy Bar is a shifting, fan-shaped sand shoal that obstructs the entrance to Doboy Sound and extends from Sapelo Island on the north to Wolf Island on the south. Vessels, after crossing the bar, entered Doboy Sound between two islands and from there moved into the Darien River. According to the preliminary examination done in 1886, the draught across the bar had diminished from 22 feet in 1875 to 18 feet in 1886.[65] Lieutenant Carter, who performed the examination, stated that vessels engaged in the coasting trade and whose average draught was approximately 15 feet found the water depths across the bar sufficient, but vessels carrying lumber or timber could not make the crossing. Shipping merchants in Darien repeatedly complained about the shallow depths across the bar, which prohibited the deep-draught vessels from taking on a full cargo and compelled them to go south to Brunswick or north to Sapelo Harbor for loading. This put Darien at a disadvantage in competing with other ports in the vicinity.

In spite of these complaints, in 1886 Colonel Gillmore was not prepared to recommend a full survey of Doboy Bar for the purpose of designing a permanent improvement project because of the expense involved. The anticipated increase in commercial activity would not justify the costs.[66] He recommended instead that a portion of the money allocated to Doboy Sound be used to increase the water depth on the harbor, where a new channel was developing.[67]

In the late 1880's Corps' activity on Doboy Bar was limited. Meanwhile, the meandering old channel across the bar was used rarely because its depth had decreased to 12 feet at mean low water. In 1896 Congress called on the Corps to determine what could be done to deepen Doboy Bar to 24 feet at mean high water and if dredging could be used to remove the present obstruction.[68] Based on a report executed by Assistant Engineer George W. Brown and directed by Captain Carter, Congress in 1899 authorized a project to establish a new channel 24 feet deep at mean high water (or 17 feet at mean low water because the tides had a range of 7 feet here) and 300 feet wide.[69] This was the first project approved solely for this location.

The Corps contracted with Rittenhouse R. Moore to dredge the new channel across the bar. After the new channel was finished, maintenance dredging was to continue for a time so that tidal currents could flow freely through the passage and scour it, perhaps even deepening it. Because less water would flow through the original channel located to the south of the new one, the old route would shoal and restrict the tidal flow, thus "giving the new channel a better chance to become self-maintaining."[70]

From the start, the Corps faced major setbacks in this project. The contractor reneged on the contract in December 1900, and the Corps subsequently annulled it. New bids for the contract were requested, but as of March 1902 none were received. When some bids finally were submitted, they were all too high. The Corps decided to dredge with a government-owned seagoing dredge, but did no work for close to 5 years. In the meantime, Congress allotted $2,000 of the 1902 appropriation for a new survey to determine the best line for dredging.[71] At the same time, the lawmakers finally recognized that improvements at Doboy Bar and Darien Harbor were related and consolidated the two projects in the Rivers and Harbors Act of 1902. However, the Corps of Engineers continued to report on them separately for several years.[72]

The seagoing dredge *Savannah* carried on dredging operations at Doboy Bar from the fall of 1905 to May 1906 before funds ran out. Part of the problem was that the *Savannah* could work only part of each day. The controlling depth on the bar at this point was 10 feet, while the dredge drew a minimum of 12 feet of water. Thus, the dredge could operate only during high water. In spite of the problems, in 1906 the District workers achieved a channel 12 feet deep at mean low water and 150 feet wide. While this was considerably less than called for in the original specifications, the Corps decided that the 12-foot channel was the best that could be attained here even with considerable maintenance dredging. Littoral currents moved sand from the shoals on either side of the sound's entrance to the extent that no channel across the bar had any stability. Moreover, since the 12-foot depth corresponded to the project depth in Darien Harbor, it would meet the needs of existing commerce.[73]

Soon after the Corps' dredge left the Doboy Bar area, shoaling began again. By the summer of 1909, the controlling depth had been reduced to 7 feet at mean low water. In fact, the new channel was never marked, and ships going to and from Darien used the old ship channel.[74] Year after year the Chief of Engineers' *Annual Report* declared "no work done this fiscal year" and "no additional work proposed and no appropriations recommended." In 1912 District Engineer Dan Kingman commented that the bar no longer warranted

improvement, and the 1914 *Annual Report* no longer discussed this project separately, but rather referred to it as a part of the Darien Harbor project. The Corps' work at this location was based on the hope that an improved channel across Doboy Bar would facilitate the shipment of timber from Darien Harbor and that the Altamaha timber would be shipped via Doboy Bar once it was appropriately improved.[75] Unfortunately, such improvements never were realized.

The problems encountered at Doboy Bar had a negative effect on the project at Darien Harbor. This was dramatized by the results of a new preliminary examination carried out by the Savannah District for improving Darien Harbor to a depth of 18 feet across the bar. Kingman opposed pursuing any further work on Doboy Bar because of the difficulty in controlling the movement of sand in that area. As he put it, "Extensive sand shoals lie to the north and south of the entrance of the sound and the material composing them is easily transported by the littoral currents which are very strong in this vicinity under the influence of the northeast or southeast winds."[76] The Board of Engineers for Rivers and Harbors reiterated the problems in maintaining a permanent channel across the bar, and Congress took no additional action.[77]

The 1911 Rivers and Harbors Act called on the Corps again to do a preliminary survey to determine the feasibility of securing a depth of 12 feet on the bar at mean low water, the same depth as in Darien Harbor.[78] Once again Kingman, the Rivers and Harbors Board, and the Chief of Engineers all spoke against any work there, citing previous arguments concerning the instability of both natural and artificial channels across the bar.[79]

Although an increasingly minor port except for the shipment of timber and lumber, Darien Harbor had its local and congressional advocates, including Georgia Senator Hoke Smith and Representative Charles G. Edwards. That support brought inclusion in the 1912 Rivers and Harbors Act of yet another provision for an examination of the harbor, this time "with a view to securing the best channel to the sea."[80] Because the route via the Darien River and Doboy Sound was being opposed by the Corps, Colonel Kingman and Assistant Engineer William C. Lemen, who actually performed the study, surveyed three alternative routes: one through the mouth of the Altamaha River and Altamaha Sound; one through Front River and Sapelo Sound farther north; and one via Old Teakettle Creek, Creighton Narrows, Front River, and Sapelo Sound, a route already being developed as part of the Inside Water Route along the Georgia coast. Because the law required the Corps to specify "the best channel to the sea," Kingman acknowledged the third alternative as the best route, but then stated his opposition to any improvement there beyond what had already been provided for.

Because of Darien's proximity to the ocean, goods brought down the river had been transferred there to vessels that could navigate to the sea. However, when a larger class of vessel came into use, Darien's maximum 12-foot depth at low tide caused it to be replaced as a shipping point. In an effort to put an end to the lawmakers' continued interest in Darien Harbor, Kingman apprised Congress of the fact:

> When a larger class of vessels began to be used, shipments were made from Doboy Island and other points nearer the sea, and now almost

> everything that is brought down the Altamaha River for shipment is carried either to Brunswick on the south or to Front River or to Savannah on the north. There is no likelihood of this condition ever being changed. The large ports draw the vessels, and the numerous vessels attract the freight. A small place like Darien could not furnish quickly the freight for a single large ship, even if a large ship could reach its wharves. It would be better to consider this simply as a landing place on the Altamaha River and look for a harbor elsewhere — look for it at some point reached via the inside water route.[81]

In his references to this one small port town on the Georgia coast, Kingman summed up the situation for many Corps of Engineers' projects, not only in the Savannah District, but along the entire eastern seaboard.

Shoaling and lack of funds continued to plague Darien Harbor and the Corps' work there. Year after year the *Annual Report* of the Chief of Engineers declared that no work had been done on this project. During 1918 and 1919 the pipeline dredge *Creighton* did some maintenance dredging. However, this was done only as a result of the 1913 Rivers and Harbors Act's provision that the Secretary of War could use part of the appropriation for the inland waterway from Savannah to Fernandina, Florida, for maintaining Darien Harbor.[82] In the meantime, the wing dams deteriorated and needed major repairs.

The last significant work on the harbor was done in the mid-1920's. The *Creighton* was used for dredging to restore the stated depth, and the snagboat



*An early picture of the U.S. pipeline dredge* Creighton *which was used in Darien Harbor. n.d. (Savannah District, Corps of Engineers)*




*A sketch map of Darien Harbor and Doboy Bar showing alternate routes from Darien to the sea including Front River and Sapelo Sound, 12 October 1912. (H. Doc. No. 1354, 62d Cong., 3d Sess.)*

*No. 1* removed snags and stumps.[83] After that time, the Corps proposed no work because "the commerce using this waterway is wlast such that it is expected no work will be necessary."[84] Darien Harbor reported on in the Annual Report of 1932; after that time it ceased to be included in the Savannah District's list of projects.

## SAPELO HARBOR

Another of the small and primarily local projects of the Savannah District along the Georgia coast was Sapelo Harbor, also known as the Front River. Approximately 6 miles long, the river flows into Sapelo Sound, one of the outlets to the sea for the Altamaha system. There was neither a town nor rail or highway connections at Sapelo Harbor. Rather, it was the site of some docks and mooring places where ships could pick up the timber and lumber floated down the Altamaha River and through Darien Harbor.

Although only the lower 2 miles of the Front River were used for shipping, this section had three shoals that hampered vessels entering and leaving the harbor. As most of the business was carried on below the third shoal, the 1910 Rivers and Harbors Act provided for dredging a channel through the lower two shoals at a depth of 17 feet at mean low water and a width of 150 feet.[85] Congress appropriated $10,000 and added $11,000 the following year. The Corps of Engineers contracted with P. Sanford Ross to do the work, which was completed in November 1911.[86]

As with Darien Harbor and Doboy Bar, shoaling was a constant threat to Sapelo Harbor. In 1915 and 1916 the Engineers redredged part of the harbor,

using the U.S. dredges *Augusta* and *Creighton,* respectively.[87] During World War I, the harbor deteriorated rapidly from lack of attention. Not until 1922 and 1923 did the Corps renew dredging, again using the *Creighton,* but the commitment to maintaining the harbor was waning rapidly. In 1926 the Corps recommended that the project be abandoned, along with 123 others. The Chief of Engineers explained that "taken as a whole, these projects once served a useful purpose and justified the expenditures made on them. Altered economic conditions have been responsible for their present disuse." He added that "projects which have outlived their usefulness, though in the past they justified themselves, should not continue to remain on the approved list."[88] The Engineers last reported on Sapelo Harbor in the 1931 *Annual Report.*

The harbor's decline as a Corps of Engineers' project was related to the decline in commerce using the port. At the time of the congressional authorization in 1910, an estimated 18,850,000 feet (board measure) of lumber with a value of $277,500 was shipped from Sapelo Harbor.[89] The timber was exported "almost exclusively" for foreign ports. The outbreak of World War I drastically reduced this figure; the Corps reported no commerce in 1917 and 1918.[90] While the first years following the war brought a slight revival in trade and lumber shipments, no commerce passed through the harbor from 1923 to 1927. Thus, the Corps ceased to recommend the harbor for work, and by the early 1930s did not include it in the Savannah District's list of projects.

# 7 THE LOWER COAST

## BRUNSWICK HARBOR

One of the Savannah District's most extensive and significant projects was the improvement of Brunswick Harbor. In terms of potential for development and economic value, this harbor ranked second on the Georgia coast only to Savannah Harbor.

Approximately 2 miles above Brunswick, the Turtle River is divided into two branches by Buzzard's Island. The smaller of these waterways flows east of the island and passes the city. This channel is known as East River, and its lower portion forms Brunswick Harbor. The Turtle River forms the channel flowing to the west of Buzzard's Island. The two streams reunite about 1.5 miles below the city to form the Brunswick River, which enters the Atlantic Ocean through St. Simons Sound 9 miles east of Brunswick. When improvements were begun, the primary obstacle to navigation in the East River channel was a shoal located about 1 mile south of Brunswick near the point where the two channels come together to form Brunswick River. In 1880 the low-water depth across this shoal was only 9 to 10 feet as compared to 15 feet in other parts of the channel and 16 or 17 feet on the sea bar.[1]

The boundary definitions of Brunswick Harbor changed over the years. As late as 1900 it was said to comprise only the lower section of East River along which the city of Brunswick lay. Within a few years, however, the harbor, and therefore the project for improvement, was expanded to include a channel across the bar, St. Simons Sound, the Brunswick River, and the Turtle River up to the Southern Railway terminals as well as East River and about a mile of Academy Creek, a tidal creek that flows into East River.

The first plan for improving this harbor was included in Quincy A. Gillmore's April 1876 report in response to a request from the U.S. Senate. The project was adopted formally in the Rivers and Harbors Act of 1879.[2] It provided for establishing a channel depth of 15 feet at mean low water through the shoal in East River. This was accomplished by building a training wall or low jetty in East River to constrict the flow of the ebb current in that channel and by dredging the shoal at the lower end of East River to a depth of 15 feet at low water. Gillmore anticipated, however, that additional works would be needed to increase the ebb flow in East River.[3]

By 1886 it became evident that more extensive work was needed for Bruns-

wick Harbor in order to secure the desired 15-foot depth across the shoal at the lower end of East River. Gillmore recommended that the work include a low dam across the Turtle River at the upper end of Buzzard's Island, dredging near the dam to create an increased volume of water entering East River, short spur jetties in the lower part of East River to constrict the waterway, and additional dredging of the obstructing shoal.[4] He had anticipated that the project would be enhanced by a bulkhead along the city shore of the river, which would be built "either by the city authorities or by the riparian owners directly interested in the improvement of the ship channel." However, this bulkhead still had not been built as of 1886. In June of that year the existing training wall was in good condition, but because no dredging had been done for 3 years due to lack of funds and because no additional works had been constructed, some shoaling had taken place in the dredged channel. Nevertheless, the minimum depth from Brunswick River to the city wharves on East River was reported to be not less than 14 feet.[5]

For the rest of the 19th century, the channel was maintained at an average depth of 14 to 15 feet by periodic dredging and maintenance work on the Buzzard's Island training wall. In November 1894 the local Engineer asserted that "it was more economical and advantageous to maintain the 15-foot depth by keeping the training wall in good condition and by annual dredging than by constructing a dam across Turtle River and further channel contraction."[6] This work completed the Brunswick Harbor project as called for by Congress, and the Chief of Engineers' office proposed dropping the harbor from the list of works under the Savannah District office. However, Captain Oberlin Carter, District Engineer, recommended retaining it on the list of future projects.[7]

Congress soon provided for improvements in Academy Creek as an extension of Brunswick Harbor, and the Rivers and Harbors Act of 1899 called for a preliminary examination and survey of this harbor to determine the need for additional work.[8] The Savannah Engineers recommended raising the already-built training wall and doing additional dredging through the shoal in East River to provide a depth of 21 feet at mean low water. District Engineer Captain Cassius E. Gillette supervised the survey and recommended the improvement on the basis of the commercial activity in the port, which he said was "large, important, and increasing."[9] The Southeast Division Engineer echoed this enthusiasm for continued improvement of the harbor when in early 1902 he described Brunswick as "a growing town of considerable commercial importance."[10] In the meantime, however, little work was done on the project, and the channel began to deteriorate.[11]

At the same time Congress called for the new study of the harbor in the area of East River, it also provided for a survey of the outer bar at Brunswick. The purpose was to develop a plan and cost estimate for improving a channel across the bar at a depth of 26 feet at mean high tide and a width of 200 feet.[12] Gillette and the Savannah District Engineer executed this study. In December 1900, after ruling out dynamiting and construction of jetties or a curved breakwater, Gillette recommended that the channel across the bar be achieved by dredging. Moreover, because of the anticipated maintenance dredging, he urged Congress to provide funds for constructing a Government dredge for the Brunswick Harbor project.[13]

The reports stemming from the studies required under the 1899 Rivers and Harbors Act formed the basis for a new project for Brunswick Harbor in the Rivers and Harbors Act of 1902. Congress authorized the improvement of the inner harbor, providing for a channel 21 feet deep at mean low water. The work



*View of Brunswick Harbor looking down the harbor from the upper end of East River or inner harbor, c. 1900. (C.S. Tait, Sr., Collection, Brunswick, Georgia)*



*Early view of the new Post Office and Federal Government Building in Brunswick completed in 1903. The Corps of Engineers suboffice was moved here in 1903 from Fernandina and was located on the second floor. Flying below the American flag is the flag of the U.S. Customs Service which was also housed in the new building. (C.S. Tait, Sr., Collection, Brunswick, Georgia)*

would include dredging in Academy Creek and, significantly, developing a channel across the outer bar 19.3 feet deep at mean low water and 26 feet at mean high water.[14] Gillette's survey and report and the provisions of the 1902 Rivers and Harbors Act marked the beginning of the Corps' involvement in improvements on the outer bar and the recognition that improvements there were an integral part of the overall development of Brunswick Harbor. Prior to this time, all work on the outer bar had been done under a direct contract between Congress and Charles P. Goodyear, a private contractor in Brunswick.

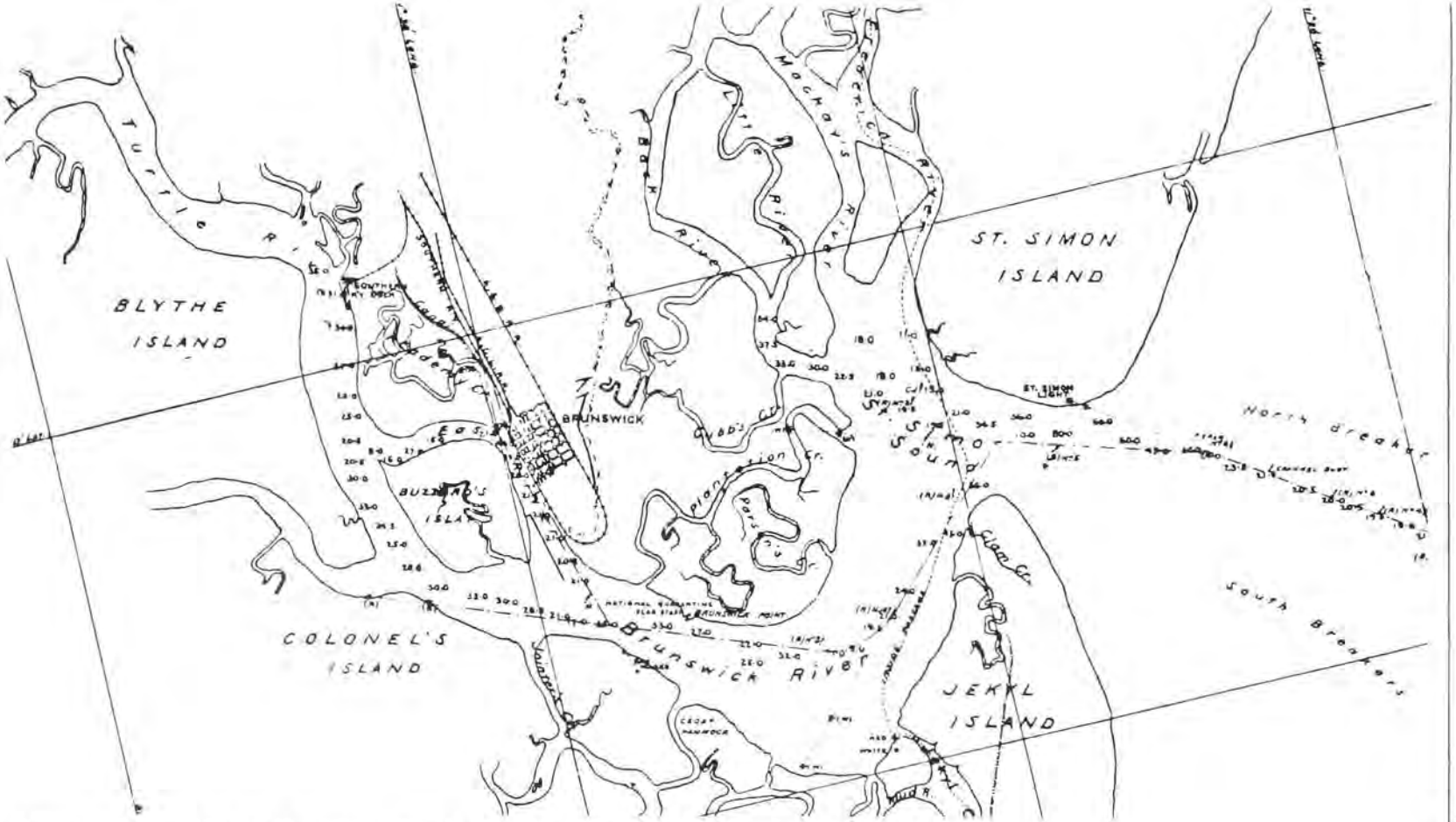
The Corps contracted with the Morris and Cumings Dredging Company of New York to do the dredging operations in the inner harbor. They completed the work in Academy Creek in 1903 and that in East River by fall 1904. Dredging on the outer bar was delayed several months after it was determined that this work could best be done by the Corps using a Government seagoing dredge. Finally, the U.S. dredge *Cumberland* was brought in, Congress having failed to provide funds for Brunswick to have its own dredge. The work was completed in July 1905. The improvement also included raising the old training wall at the entrance to East River, which a Jacksonville, Florida, firm did under contract.

For years the sub-office serving the Savannah District area ranging from Doboy Bar south to Fernandina Harbor, Florida, had been located in Fernandina. In 1903 the Savannah District office opened a sub-office in Brunswick in the town's new Post Office and Federal Government Building. Moving the sub-office headquarters to Brunswick was not necessarily an indication of the Corps' commitment to developing the harbor there. The decision was based on economics; office space in Fernandina had to be rented while Brunswick's new public building had free space available for the Corps.[15]

As the Corps was finishing the project authorized in 1902, Congress ordered




*The steamboat* Atlantic *in Brunswick Harbor, its home port, in the early 20th century. (Brunswick-Glynn County Regional Libary)*




*Map of Brunswick Harbor, December 1905. (H. Doc. No. 407, 59th Cong., 1st Sess.)*




*The steamboat* City of Brunswick *in Brunswick Harbor in the early 20th century. (Brunswick-Glynn County Regional Library)*

a preliminary examination and survey of the inner and outer harbors at Brunswick to ascertain the possibility of establishing a depth on the outer bar equal to the controlling depth of the inner harbor.[16] Lieutenant Colonel James B. Quinn supervised the new study, which was made by Elbridge R. Conant, Assistant Engineer in Brunswick. The study recommended a project for attaining a 30-foot depth at mean high water in both the inner and outer harbors.[17] The 1907 Rivers and Harbors Act approved the recommended project, calling for the 30-foot mean high-water depth in the inner harbor (now defined as including the Turtle River from the Southern Railway docks to its junction with the Brunswick River, Academy Creek from Aiken's Wharf to its junction with East River, and East River itself) and the outer harbor (specifically embracing the outer bar and a channel through St. Simons Sound and up the Brunswick River to Brunswick Point). The width of the proposed harbor channel varied from 150 feet in Academy Creek to 400 feet across the outer bar. Dredging was to be the principal activity, although the plan provided for extending the East River training wall and constructing two spur dikes.[18]

The dredging was done by two contractors over the next few years. P. Sanford Ross (Incorporated) of New Jersey was awarded the contract for dredging in most of the inner harbor and completed the work between September 1907 and April 1909. The Coastwise Dredging Company held the contract for work on the shoal opposite Brunswick Point in the inner harbor and all dredging in the outer harbor. This part of the project was finished in November 1909.[19] Two areas, one in East River opposite Brunswick and one in the Turtle River opposite Buzzard's Island, were composed of "refractory material" that had been left from previous work. Dredging at these locations was needed to complete the project, and the Corps hired the P. Sanford Ross Company under a separate contract to remove these materials. The dredging, a difficult task requiring the use of a rock breaker and a dipper dredge, was done in 1910 and 1911. At one point in the operations, the contractor's dredge sank and work was delayed for a while.[20] In 1911 and 1912 George W. Parkhill of Jacksonville carried out

operations to extend the training wall and raise it to mean high-water level under contract with the Corps.[21] This 1907 project was declared completed in 1912.

Over the next several years, the major concerns were moderate shoaling at various locations in the harbor and the efforts needed to protect the project depth. Academy Creek and East River posed the worst problems because of their short lengths; creating an effective tidal flow to provide a natural scour of the channels was impossible. Some shoaling also occurred on the outer bar and across from Brunswick Point, as well as in the lower reaches of the Turtle River. Maintenance dredging in the two parts of the upper harbor was carried on by contract. The Corps did the dredging on the bar at Brunswick Point Crossing and on the shoal in the lower Turtle River. The Engineers used the Government seagoing dredges *Galveston,* rented from the Galveston District; *Sumter,* rented from the Charleston District; and the Savannah District's own *Savannah* and *Cumberland.* At the same time, the training wall was raised and extended.[22]

Under provisions of the Rivers and Harbors Acts of 1886 and 1899, the Secretary of War was authorized to define harbor lines, a power that was in turn delegated to the Corps of Engineers.[23] As a result, Corps activities in Brunswick Harbor involved more than just dredging operations and the surveys and examinations ordered by Congress. The District also was responsible for establishing and enforcing harbor lines. The Corps exercised this authority in 1889 when the District Officer in Savannah established a board to determine "a line beyond which no structure be allowed to project into the river." The Secretary of War subsequently approved it as the official line in the inner harbor even though at the time some wharves extended beyond it too far out into the East River.[24] In 1906 the Engineers revised the harbor line, extending it 1.5 miles below the town




*The Downing Company Building at the foot of Monck Street in Brunswick in the 1890s. (Mrs. George Cook, Jr., Brunswick, Georgia)*

to the Quarantine Station while retaining the original location along the town's waterfront.

Seemingly this would be one of the more easily administered responsibilities of the Corps, but in early 1913 District Engineer Dan Kingman became involved in a major controversy over the issue of Brunswick's Harbor line. The Downing Company, a major shipper of naval stores as well as dealer in wholesale groceries and drygoods, applied for permission to repair its dock between Gloucester and Monck Streets. This dock had extended 15 to 20 feet beyond the recognized harbor line for 24 years. Kingman urged that the request be denied, asserting that any repairs to the dock should be behind the official line. He stated that the wharf caused a narrowing of East River that resulted in "troublesome shoaling above and below this contracted place."



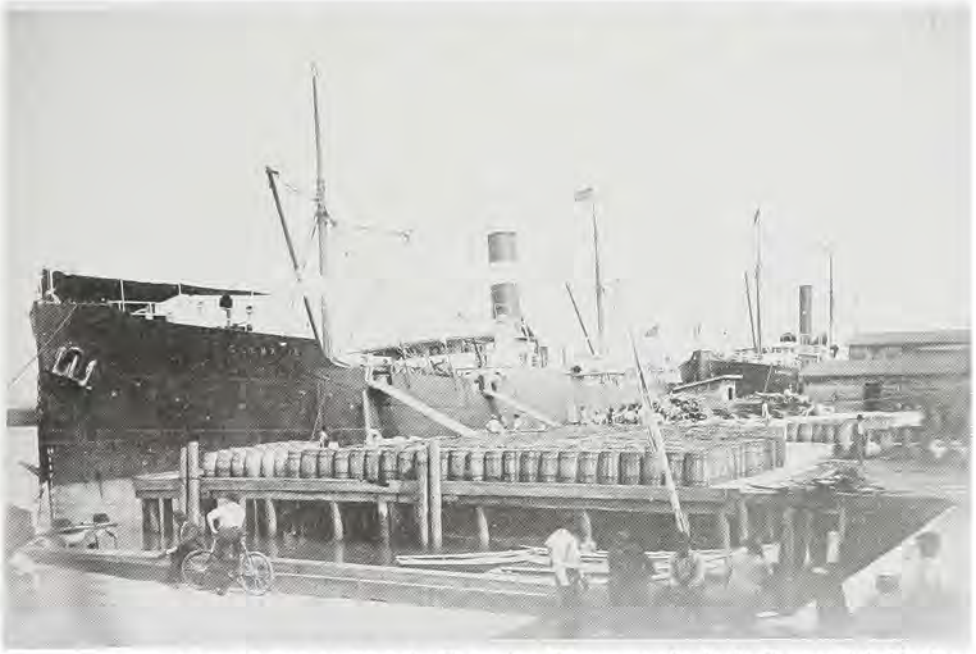
*The Downing Company docks between Monck Street and Gloucester Street in the 1890's. Note the barrels used for shipment of naval stores. The view is looking south down the East River toward Brunswick River in the distance with Buzzard Island on the right. (Mrs. George Cook, Jr., Brunswick, Georgia)*

The controversy mushroomed as Columbia Downing, president of the company and a prominent Brunswick citizen, wrote Georgia Congressman William G. Brantley, who in turn contacted the Chief of Engineers. The Brunswick City Council passed a resolution supporting the company's request, and the chairman of the Board of Pilot Commissioners for the Port of Brunswick wrote a letter on Downing's behalf. Kingman continued to insist that the Corps should enforce the harbor line, however. "If we want the harbor lines to be observed and respected we must observe and respect them ourselves," he wrote. "We cannot expect the public to be governed by them if we allow them to be treated as a thing to be shifted, altered, and modified or played with and juggled with whenever it meets with the convenience or pecuniary advantage of some riparian owner."

Apparently, politics prevailed. The Chief of Engineers instructed Kingman to review the harbor line. Reflecting an air of frustration, the District Engineer finally yielded to the change "if the department is prepared to overlook the fact that wharf owners have disregarded the harbor line from the first and have been persistent violators of the law." On 28 July 1913 Kingman was authorized to revise the line in Brunswick Harbor, and new surveys and maps were made over the next few years. In the fall of 1916 the new line was made final.[25]

Brunswick Harbor was the object of another political controversy at that time. Years earlier Captain Gillette had proposed constructing a dredge to be used for the project, but to no avail. All the work was done either by contract or by vessels pulled from elsewhere in the Savannah District or rented from other Districts. In 1914 and 1915 District Engineer Langfitt again proposed building Government dredges for the harbor work, reflecting the Corps' attitude that Government plant using hired labor could do the job more cost effectively than could contractors. Judging from the comments of the Chief of Engineers, dredging companies were opposed to this thinking, however. After hearing of the dredge owners' objections to Government-built dredges, the Chief of Engineers stated that "this agitation has reached a point where any reference to the construction of additional dredges in survey reports is much more likely to result in legislation prohibiting any further construction of dredges anywhere than it is to result in the authorization of additional dredges."[26] Apparently, in this case Congress was more sensitive to the complaints of business interests than to the recommendations of the Corps of Engineers.

Although failing to get congressional support for its own dredge, Brunswick Harbor certainly did not lack support on Capitol Hill for its continued expansion and development. In March 1913 Congress called for yet another prelimi-



*The steamboat* Clematis *docked at the Downing Company docks in Brunswick Harbor in the early 20th century. (C.S. Tait, Sr., Collection, Brunswick, Georgia)*

nary examination and survey of the harbor to determine the possibility of making it deeper.[27] Colonel Kingman responded favorably in his report on the survey. After being named Chief of Engineers, he further supported the cause by explaining that the existing harbor depth was not sufficient to accommodate the larger ships now using this port. Moreover, he added that the steady increase in the commerce of Brunswick Harbor justified the project to deepen the harbor.[28]

As District Engineer in 1916, Colonel Langfitt also recommended the deepening of the harbor.[29] However, with the advent of U.S. participation in World War I, national defense value of a project became one of the most important criteria for its inclusion in the Chief of Engineers' recommendation for funding — and likewise in the Rivers and Harbors Act of 1917. Because Brunswick's harbor had no part in Army or Navy defense measures during the war, it received no appropriations. As Secretary of War Newton D. Baker stated, ". . . in this case the work is more a question of convenience than of necessity."[30] Therefore, Brunswick would receive only maintenance funds. The *Savannah* continued to do maintenance dredging on the bar from time to time, as did the *Caucus* from the Montgomery District. Some dredging, under permit from the Corps, also was done in East River by companies having wharves or terminals in the inner harbor.

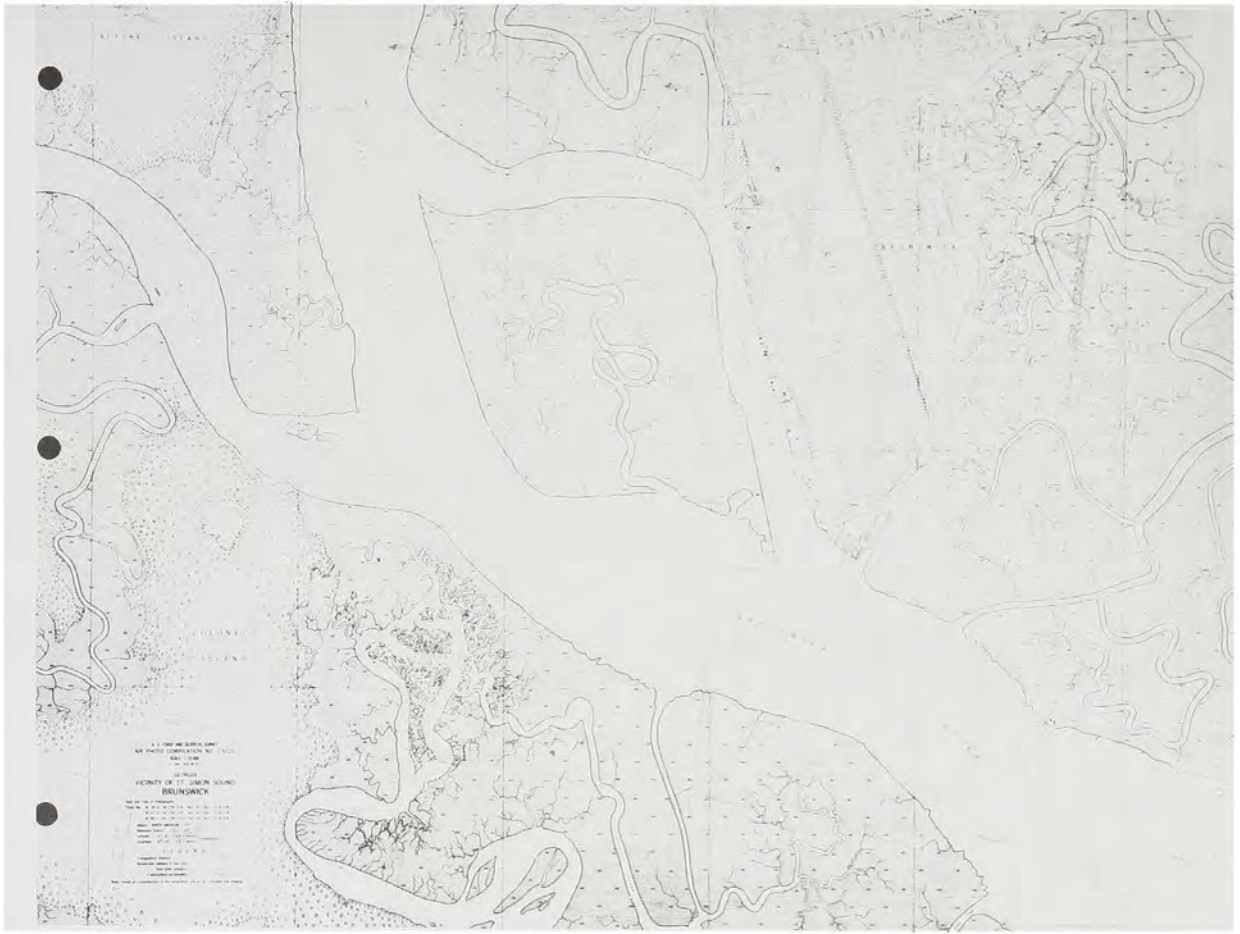
Following World War I, the Rivers and Harbors Act of 1919 authorized $500,000 for the new improvement, with 80 percent of the money going for construction of a seagoing dredge. Plans and specifications were prepared for a hopper dredge similar to the *Cumberland* and *Savannah*, already in use in the District and on occasion in Brunswick Harbor. To honor the District's former commanding officer, the vessel was to be named the *Kingman*.

The act also provided for a new project with channel dimensions at mean low water of 27 feet deep and 500 feet wide through the bar (or approximately 33.3 feet at mean high water), 24 feet deep and 400 feet wide at Brunswick Point, 24 feet deep and 350 feet wide in the East and Turtle Rivers, and 24 feet deep and 150 feet wide in Academy Creek. In addition, a cut from Academy Creek to the Turtle River was provided for if deemed advisable in the future. However, a new obstacle arose — a clause contained in the law itself:

> No work shall be undertaken upon any new project herein adopted unless the Secretary of War shall be of the opinion that, based upon the cost at the time of entering upon the work, the project can be completed at a cost not greater than 40 per centum in excess of the estimate of cost in the report upon such project.[31]

The Chief of Engineers determined that the new work at Brunswick Harbor could not meet that criteria. Funds were denied not only for the Brunswick Harbor channel improvements, but for the dredge as well. In 1920 Colonel Frederick W. Altstaetter, then District Engineer, announced that the money designated for the dredge was diverted to other uses.[32]

The seagoing dredge *Savannah* continued maintenance operations until funds ran out in March 1920. At that time Colonel Altstaetter ordered the dredge to Savannah for work on that harbor. This move elicited a protest from the citizens of Brunswick and intensified the sense of rivalry developing between the two areas. Several years before, as the Board of Engineers for




*Map of the inner harbor at Brunswick, 1933. (Savannah District, Corps of Engineers)*

Rivers and Harbors was reviewing the preliminary examination leading to the recommendation for deepening Brunswick Harbor, one observer had noted, "Comparisons 'between the two ports,' are odious. Naturally, neither port desires that the other shall enjoy a greater facility in this respect than it does."[33] The people of Brunswick had resented the awarding of funds for a new project in Savannah Harbor in the 1917 Rivers and Harbors Act, the same act that had denied their harbor appropriations for the deepening of the channel based on its having no national defense value.[34] So, with the decision to remove the *Savannah,* the chairman of Brunswick's Harbor Advisory Committee commented, "We know our Savannah friends pretty well and feel sure that they have always made it 'extremely hot' for United States Engineers who would not do just what Savannah wanted, and as the Engineer in charge resides there, the Savannah influence is much greater than anything we could bring to bear."[35] Alstaetter acknowledged that "there is a feeling in Brunswick that this [District] office cannot treat them fairly because it is located in Savannah." He added, however, that "the dredge was brought back to Savannah because it was thought the right thing to do and not because of local pressure."[36] The Chief of Engineers said there simply was not enough money left in the Brunswick Harbor appropriation to cover further expenses for the *Savannah.*[37]

The 1920 Rivers and Harbors Act repealed the "40 percent" restriction of the previous year. During the 1920's, therefore, the Corps proceeded with the deepening of Brunswick Harbor as well as with maintenance. The Engineers



*The S.S.* W. M. Irish, *a tanker belonging to the Atlantic Refining Company, tied up at the company's docks on the Turtle River in Brunswick Harbor on 28 April 1920. Petroleum products were an important commodity shipped through Brunswick Harbor during the 1920's. (Savannah District, Corps of Engineers)*

generally used Government plant and hired labor, although some dredging was done by contract. The project was approximately 90 percent complete when Congress in 1930 authorized further deepening of the harbor to 30 feet deep and 500 feet wide over the bar; 27 feet deep and 400 feet wide at Brunswick Point; 27 feet deep and 350 feet wide in East River; and 27 feet deep and 300 feet wide in the Turtle River.[38] Congress also expanded the size of Brunswick Harbor. First, the lawmakers included the section of the Turtle River between the Southern Railway Company wharf and a wharf farther upriver belonging to the Atlantic Refining Company, which had built a refinery there shortly after World War I. Second, it authorized improvements on the Back River, an estuary of the St. Simons Sound tributary to Brunswick Harbor, according to Corps recommendations for a channel 20 feet deep and 150 feet wide from St. Simons Sound to the mouth of Mill Creek above the mouth of Terry Creek.[39] Back River already had been included in the Intracoastal Waterway in 1919 and had the required width, but a depth of only 7 feet.

Soon the Corps again was dredging in the harbor channels, which included maintenance dredging as well as new work. Much of the work was done by hired labor and Government dredges such as the *Savannah* and the *Gilmer,* as well as the new hopper dredge the *Kingman.* However, the Corps also continued to contract out some of the dredging. The Back River project was completed in 1931, as was the one in the Turtle River. The work in East River and at Brunswick Point was completed the following year. Project depth and width were achieved on the bar in 1936. Only maintenance dredging was done in Academy Creek because its project dimensions had been achieved in 1926 and were unchanged by the 1930 act. The cut from Academy Creek to Turtle River was not executed.

Funding for such operations in the 1930's came not only from the usual Corps of Engineers' appropriations, but also from allotments provided by the 1933 National Industrial Recovery Act through the Public Works Administration. In addition, the second Deficiency Appropriation Act of 1935 gave the Savannah District $72,000 for work on Brunswick Harbor. This law was designed to provide funds for maintenance and improvement of existing river and harbor works, particularly the Bonneville Dam project. However, part of the funds also were to be made available to continue the operation of Government dredges on "essential" work. Brunswick Harbor was designated as one of the projects to benefit from this appropriation.[40]

During these years of expanded Corps' activity in Brunswick Harbor, the Engineers sometimes failed to see beyond the navigational benefits of a project. One example of this occurred in 1922 when the local Board of Trade (managed by Fred G. Warde and the Harbor Advisory Committee, chaired by Frank D. Aiken) brought attention to the erosion problem on the south end of St. Simons Island near Brunswick. Aiken cited the Corps' work on the harbor channel as the cause of the erosion. Warde and Aiken proposed that two or three of the naval ships scrapped under terms of the Washington Naval Disarmament Conference Treaty be sunk near St. Simons Island to serve as a breakwater to retard the erosion.[41] According to the acting Chief of Engineers, the Corps had no funds for this type of undertaking. Moreover, Secretary of War John W. Weeks claimed that no agency, except possibly the Lighthouse Service, could do any-



*The U.S. pipeline dredge* Gilmer, *one of the dredges used by the Corps of Engineers in Brunswick Harbor in May 1921. (Savannah District, Corps of Engineers)*

thing.[42] Until the fall of 1922 this discussion continued in the Senate and at high executive and military levels. Finally, District Engineer Altstaetter was called in to study the proposal. He rejected the idea, viewing the situation only in terms of value to navigation. He stated that it would be "inadvisable to experiment with a breakwater at this point of the kind requested, with a viewpoint to improve navigation," because of the expense involved. Altstaetter recommended that improvement of the harbor be continued "by use of tried methods which are proving very successful."[43] The Savannah District Officer felt that dealing with shore erosion was not part of the Corps' mission.

Another situation further illustrated the Corps' position. Early in 1930 Leon E. Robarts of the Diamond Back Terrapin Farm near Brunswick complained of pollution in the tidewaters of the area. The Savannah District office investigated the charge and discovered oil and other pollutants in the water, deposited by

nearby industries. Because the Engineers could not establish that the pollution interfered with navigation in any way, however, they claimed no authority in the matter and recommended that Robarts contact state officials. The Corps' role as protector of the waterways environment was not yet at hand.[44]

During the early days of the Depression, the Savannah District Engineer faced yet another protest when he decided to close the Brunswick sub-office, which had been operating since 1903. The people of Brunswick rose up in protest and their letter-writing campaign resulted in the retention of the office there for another decade.[45]

The 1938 Rivers and Harbors Act authorized the Corps to develop in Terry Creek, which connects with St. Simons Sound and Brunswick Harbor via the Back River, a channel 10 feet deep and 80 feet wide from its mouth to the wharf of the Glynn Canning Company. Prior to World War I, efforts to improve this creek as part of the Intracoastal Waterway had failed because of the waterway's value to only a few industries located along its banks. These same industries now prevailed on Congress to have the Corps dredge the desired channel as an expansion of Brunswick Harbor.[46] The project was completed in 1939. While the Corps was adding channels to the Brunswick Harbor, improving and maintaining the existing project by dredging, it also began reducing the project's scope by eliminating some areas of maintenance. In 1939, for example, the Engineers dropped the Back River and Academy Creek from their maintenance responsibilities in this harbor.[47]

Statistics regarding commerce between 1880 and World War II generally supported the case for improvements in Brunswick Harbor. In 1880 the popula-



*The City Wharf and freight terminals of the Plant System in Brunswick Harbor c. 1902. The view is looking southwest across East River with the South Brunswick River in the distance beyond Buzzard Island. (Board of Trade, Brunswick, Georgia,* Brunswick and Glynn County, Georgia, *1902)*

tion of the city was less than 3,000; by 1890 it had increased to approximately 12,000.[48] Two railroads were built, linking the city with the north and northwest as well as with points across Georgia and into Alabama. A large fleet of foreign and coastal vessels began to provide Brunswick with commercial connections on both national and international levels. Primary products were timber, naval stores, cotton, and agricultural products. In 1890 it was reported that "owing to past works of improvement in the harbor, freight rates have been reduced from 18 to 20 percent and that, if the improvements were completed according to the existing project, the total volume of trade would be increased 200 percent."[49]

In the first decade of the 1900's, tonnage totals exceeded one million, with values ranging well into millions of dollars. The commodities passing through the port remained typical of south Georgia and included cotton, lumber, crossties, and naval stores. The bulk of the trade was local or intracoastal, carried on small steamers operating between Brunswick and adjacent ports and on numerous schooners, sailboats, tugs, and launches using the inland waters. According to the Corps, many foreign ships traveled between Brunswick and Boston and/or New York. The year 1908 was particularly noteworthy; three steamer lines running 24 steamers operated regularly through Brunswick. The Mallory Line stopped at Brunswick in its passage between New York and Mobile, Alabama; and the Clyde Line ran its ships between Boston and Brunswick. The Brunswick Steamship Company or Bee Line, a subsidiary of the Atlanta, Birmingham and Atlantic Railroad, operated between New York and Brunswick and part of the year sailed on from Brunswick to Havana, Cuba.

Although the total tonnage of commerce at Brunswick Harbor declined between 1910 and 1920, the value of those commodities increased significantly. Conversely, while tonnage increased in the 1920s, its value decreased. The



*View of the lumber wharves of the Plant System, Brunswick Harbor, c. 1902. The view is looking northwest toward Academy Creek in the distance. (Board of Trade, Brunswick, Georgia,* Brunswick and Glynn County, Georgia, *1902)*



*Barrels of naval stores stacked at the Downing Company docks, Brunswick Harbor, c. 1900. (C.S. Tait, Sr., Collection, Brunswick, Georgia)*

Corps explained this fact in part by pointing out that, although the Atlantic Refining Company was now shipping its petroleum products through Brunswick Harbor, the high tonnage figure carried a generally low value.[50] The Depression brought a low of 147,236 tons of commerce valued in 1938 at only $5,821,155.[51] Commerce and, accordingly, Corps work in Brunswick Harbor continued to decline over the next two decades.

**FANCY BLUFF CREEK**

Among the Savannah District's smaller projects in the early 1900's was the dredging of a channel connecting the Little Satilla River with the Turtle River and Brunswick Harbor via Fancy Bluff Creek. This creek rises in the marshes between the two rivers. Flowing north, it empties into the South Brunswick River approximately 2.5 miles west of Brunswick. In 1907 Glynn County had a 1,200-foot-long canal dug linking the headwaters of the creek with the Little Satilla River to the south, thus creating a water passage 4.5 miles long. This waterway provided a shortcut for boats coming down the Little Satilla on their way to Brunswick. However, within a few years the channel was navigable only at high tide.[52] Responding to a favorable report from Colonel Kingman, Congress adopted a project in 1913 calling for a channel 4 feet deep at mean low water and at least 50 feet wide along the entire length of Fancy Bluff Creek and the canal.[53] The Corps used the U.S. pumpboat *Augusta,* modified for use in salt water, and employed hired labor for the dredging, which took place from August 1913 to January 1914.[54]

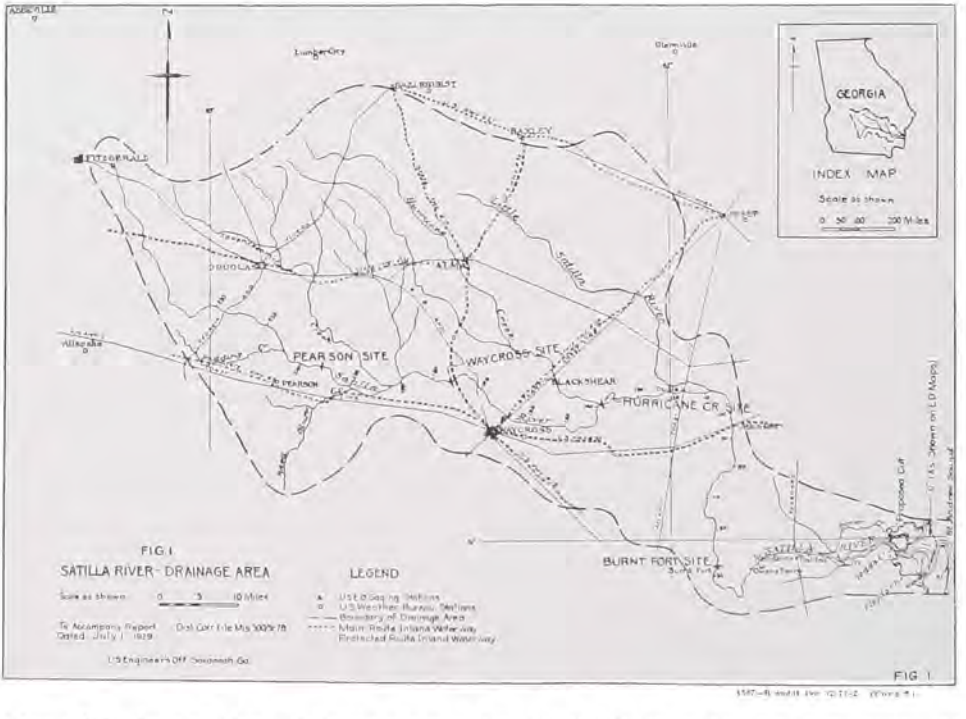
As originally envisioned, the project would not require maintenance work. However, early in 1914 and again in 1915 the *Augusta* was recalled to do restoration dredging due to sloughing and shoaling. The Corps did additional maintenance dredging in the summer of 1919 and again in September 1923.

Despite continued deterioration of the waterway, the Corps did no further work after 1923. The project was dropped from the Savannah District Engineer's report after 1935.

The Corps' involvement on Fancy Bluff Creek was, of course, related to the value of such an improvement to commerce. After Glynn County completed building the original canal, the waterway carried light draft traffic "of considerable proportions" even though it was navigable only from half tide to high tide. For example, in 1912 an estimated 3,200 short tons of commerce valued at $72,000 passed over it, and the Engineers expected the commercial activity to more than double after the new project was completed.[55] After all, the waterway shortened the distance between the Little Satilla River and Brunswick by 16 miles and allowed boats to avoid the rough waters of Jekyll Sound.[56] Corps' records reflected the increased commerce because of this shortcut, which reached a high point in 1926 of 10,643 tons valued at $443,700. However, the Depression affected this small project as well; in 1935 only 10 tons, with a value of $1,650, passed over Fancy Bluff Creek.[57] The economic crises of the era, along with the Corps' attention to major projects, signaled this project's deletion from the Savannah District's list of improvements.

## SATILLA RIVER

Another south Georgia river to be improved by the Savannah District office in the early 20th century was the Satilla. Originating some 350 miles into the interior of the state, the river flows into St. Andrews Sound between Cum-




*Map of the Satilla River Drainage Area, 1 July 1929. (H. Doc. No. 52, 71st Cong., 2d Sess.)*



*The ferry at Burnt Fort on the Satilla River between Camden and Charlton Counties c. 1910. (Eloise Bailey, St. Marys, Georgia)*

berland and Jekyll islands. Before the Corps began its operations, ocean-going vessels could navigate the river from its mouth to a point known as Owens Ferry, a distance of 30 miles. The controlling depth throughout this stretch ranged from 11 to 13 feet at mean low water over a series of shoals, but generally was closer to 20 feet. Riverboats could go upstream to Burnt Fort, a site 52 miles from the mouth, because the low-water depth was not less than 6 feet up to this point. Timber rafts originated as far upriver as the town of Waycross, an additional 114-mile distance. Snags, logs, and overhanging trees were the principal obstacles to navigation.[58]

Congress first called on the Corps to make a preliminary examination and survey of this river from Burnt Fort to St. Andrews Sound in the 1909 Rivers and Harbors Act.[59] Colonel Kingman's report praised the potential of the river: "It is rather remarkable that a river of this size has never been surveyed." He recommended dredging in the lower reaches of the river below Owens Ferry to remove six shoals and to provide depth of 15 feet at mean low water from that point to the river's mouth. He also recommended a project to clear snags and other obstructions as far upstream as Burnt Fort and to provide a suitable channel during low water for boats of 6-foot draft.[60] The Board of Engineers for Rivers and Harbors, however, opposed dredging below Owens Ferry, citing its purely local value. The board charged that while the improvement would allow larger vessels to sail up the river, that benefit would be enjoyed by only two or three lumber companies located in the area.[61] Ultimately, in July 1912 Congress authorized a project limited to clearing the river of snags and making the channel suitable for boats of lesser draft.[62] The 1913 Rivers and Harbors Act provided for extending the improvement from Burnt Fort up to the Atlantic Coast Line Railroad bridge near Waycross. The work would include removing snags and closing incipient cutoffs.[63]

The Savannah District office executed this project using hired labor and Government plant, including a nonpropelled snagboat built especially for this work. By early March 1913 the Engineers' crews completed the snagging opera-

tions as far as Burnt Fort, and by November 1914 they finished the project. The controlling depth of the river was established at approximately 12 feet at mean low water as far upriver as Owens Ferry; 6 feet from that point to Burnt Fort; 3 feet for the next 100 miles; and 1 foot on to Waycross, the upper end of the improvement.[64]

After completing the project, the Corps faced the problem of maintaining the channel. Over the next three decades, the various Corps-owned snagboats, manned by hired labor, were used. These included the *Oconee, No. 1, Tugaloo,* and *Macon.* In 1925 District Engineer Major Dan Sultan reported that increased maintenance work was needed to preserve the finished project. As in the case of other warnings, this one went unheeded. Moreover, the river's importance to navigation had declined considerably over the years, leaving little justification for Corps' activity.

Congress designated the Satilla River as one of those rivers to be studied for development in terms of navigation, flood control, power, and irrigation under terms of the Rivers and Harbors Act of 1927 and House Document 308, 69th Congress, 1st session. Major Douglas L. Weart's 308 report, which followed in 1929, rejected any such development for the Satilla. The report stated that the current navigation project for the river was adequate to handle the commerce. Moreover, the periodic floods in the river valley generally did little damage, and the neighboring terrain with its wide area of lowlands rendered the river unsuited for dam construction and hydroelectric power generation at a reasonable cost. Finally, the region had no need for irrigation because the swamps and porous soil in the area provided sufficient water storage.[65]



*Flood scene at Burnt Fort on the Satilla River in the mid-1920s. (Eloise Bailey, St. Marys, Georgia)*



*Three sailing vessels at the Owens Ferry dock on the Satilla River c. 1915: left to right, the* H.D. Maxwell, *the* George W. Truett, Sr., *and the* George W. Truett, Jr. *(L.M. Dyal Collection, Eloise Bailey, St. Marys, Georgia)*

In the earliest days of improvement, lumber, lumber products, and naval stores were the principal goods passing over the river. The District Engineer's 1913 *Annual Report* declared that the upper portions of the waterway carried "considerable" commerce in the form of log rafts.[66] Colonel Langfitt, District Engineer when the project was completed, reported that the improvement now "made possible the rafting of timber at almost all stages of the river."[67] While timber interests provided the only long-term local support for the project before World War II, other types of traffic used the river at different times. In the early days of the improvement, ocean barges and sailing vessels went upstream as far as Owens Ferry, and a single-screw wooden steamer made biweekly trips between Brunswick, connected with the Satilla River by the inland waterway, and Burnt Fort. Various smaller vessels plied the lower stretches of the river as well. Following the Corps' improvements, steamboat navigation was possible for 37 miles farther upstream.[68] Much of the river commerce fell off, however, in terms of both tonnage and value. By 1940 the Savannah District office had relegated the Satilla River to the category of least important projects.

**ST. MARYS RIVER**

One of the more recent river navigation projects carried out by the Savannah District was improvement of the St. Marys River, which forms part of Georgia's southeastern boundary with Florida. The river originates in the Okefenokee Swamp and empties into Cumberland Sound about 3 miles from Fernandina, Florida. It was one of the more navigable rivers of southeastern Georgia in its original state, for the controlling depth at mean low water ranged from 13.5 feet for the first 37 miles up to Kings Ferry, the distance suitable for ocean vessels, to 4 feet some 22 miles farther upstream. Steamboats traveled this distance as early



*The steamboat* Harry Lee, *built in St. Marys, Georgia, in 1894, sailed the waters of Cumberland Sound and the St. Marys River serving St. Marys and Cumberland Island, Georgia, and Fernandina, Florida. n.d. (George T. Davis, Amelia Island, Florida)*

as 1874, and lumber was rafted downstream over the lower 70 miles of river.[69] In December 1880 Congress authorized construction of a fixed-span bridge over the river 55 miles above its mouth. The bridge, eventually belonging to the Atlantic Coast Line Railroad, was defined by this same law as the head of navigation.[70]

Congress required the Corps of Engineers to do the first preliminary survey and examination of the St. Marys River in 1909.[71] Elbridge R. Conant, Assistant Engineer in the Brunswick sub-office, carried out the survey for the District. As a result, Colonel Dan Kingman recommended dredging a channel 17 feet deep at mean low water upriver as far as Kings Ferry. The Board of Engineers for Rivers and Harbors challenged Kingman's proposal, arguing that the amount of commerce on the river and the expected benefits from the improvement would not justify the expenditure.[72] This was not the only time Kingman and the board had disagreed, and the Savannah District Engineer could not be dissuaded. Kingman wrote to "interested parties" in the St. Marys area to enlist their support for the proposed project.[73] Letters of local support were sent, and a hearing was held, but the board maintained that improvement of the St. Marys River would be of value principally to a few lumber mills. After the board urged that local cooperation be required if this project were undertaken, Kingman responded:

> I do not see any reason why the principal shippers should be called upon to contribute there any more than they are on the Ohio River or on the Hudson River. I believe if this river were situated in a portion of the country where is would be better known, it would long ago have been under improvement by the United States.[74]



*The wharf at St. Marys, Georgia, as it looked c. 1906. (Eloise Bailey, St. Marys, Georgia)*

Colonel Kingman's popularity in the Savannah District was due to this kind of support for the District's projects.

The board and the Chief of Engineers did concede the need for improvement to a depth of 17 feet at mean low water and to a width of 200 feet from the mouth of the river to Crandall, 12.5 miles upriver. Congress passed enabling legislation in the 1912 Rivers and Harbors Act, providing not only the funds needed for the approved project, but also $5,000 for clearing of snags and other obstructions from the channel up to Kings Ferry, 37 miles upstream from the river's mouth and as far beyond that point as possible.[75]

P. Sanford Ross (Incorporated) of New Jersey began dredging operations in December 1912 and finished 6 months later. The Corps used hired labor and the Government-owned snagboats *Tugaloo* and *No. 1* to remove snags and stumps from the channel. Because the work consumed less of the appropriation than expected, snagging operations were carried on all the way to Traders Hill, 59 miles from the river's mouth. The project was completed in December 1914, and, notably, no local cooperation was required.[76]

In the Rivers and Harbors Act of 1913, Congress called on the Corps to make another preliminary examination and survey of the St. Marys River, with the view to obtaining a channel 22 feet deep from deep water at the junction with Cumberland Sound up to the western limits of the town of St. Marys, Georgia.[77] Colonel Kingman again submitted a positive report, and the Board of Engineers for Rivers and Harbors again opposed it. The board argued that the lack of rail connections in St. Marys, and the fact that a deep-water port already had been established at Fernandina, failed to justify deepening the St. Marys River.[78] In his final report, Kingman again recommended a channel 22 feet deep, but congressional authorization did not follow.

Shoaling became a problem in the early life of the project; the controlling depth had been reduced to 15.5 feet by mid-summer of 1915. In 1916, 1920, and 1923 the Corps used the U.S. pipeline dredge *Creighton* for maintenance dredging. No dredging was done, however, from 1923 to World War II. Snagging operations were frequently necessary, and the Engineers used snagboats *No. 1*

and *No. 2* and, on one occasion, the *Macon* for such periodic activity up through the Depression years.

For many years, the Chief of Engineers reported that no funds were available for work on the St. Marys River. Financially hard times during the Depression partially explained the decline of Corps' activity. However, the river channel was considered adequate for the region's commerce. In 1927 the Engineers proposed to Congress that the depth of the project from St. Marys to Crandall be reduced from 17 to 14 feet at mean low water.[79] In 1930 the Chief of Engineers stated that no dredging was needed and that no "work will be necessary in the future to care for existing traffic."[80]

The prevailing attitude of the Savannah District office toward the St. Marys River was revealed in a 308 report compiled by Major Weart in September 1929. The report rejected as economically infeasible the generation of hydroelectric power by construction of a series of dams on the river and discounted the need for flood control efforts in an area where swamps collected the rainfall. Removal of snags, it stated, was the only activity needed for navigation purposes, and irrigation was unnecessary in an area that received a "large and well distributed rainfall."[81]

Originally, the principal articles of commerce on the St. Marys River were limber, crossties, and naval stores. Steamboats plied the lower reaches of the river in the early years of improvement, while farther upstream barges carried lumber products and rafts of timber and crossties. The greatest benefit from the improvement was that ships could be loaded entirely in the river rather than having to go to Fernandina or into Cumberland Sound "where the remainder of the cargo had to be lightered to complete the loading."[82] For a time the town of St. Marys was the main shipping point, and most of the traffic passed over the lower 10 miles of the improvement. Along with wood products, seafood became an important commodity.

## CUMBERLAND SOUND AND FERNANDINA HARBOR

The most southerly river and harbor activity administered by the Savannah District was the work on Cumberland Sound and its sister project, Fernandina Harbor. The sound is located between Cumberland Island, Georgia, on the north and Amelia Island, Florida, on the south. It is the principal outlet to the Atlantic Ocean for the Amelia River in coastal north Florida and the St. Marys River. This improvement ranked among the more important works of the Savannah District office during the late 19th and early to mid-20th centuries, and drifting sand was the main problem the Engineers faced.

A Senate resolution of 13 December 1875 required that "the Secretary of War be requested to communicate to the Senate his views as to the importance and practicability of improving the channel of the entrance to Cumberland Sound, with estimates of the probable cost of the construction."[83] Colonel Quincy Gillmore was to prepare the report.

The problem at the entrance to the sound was a fan-shaped bar that extended from the southern tip of Cumberland Island to the northern tip of Amelia Island. Ships entering the sound, and then the harbor at Fernandina, had to negotiate the shifting channel that crossed this bar. After surveying the records of previous examinations dating back to 1843, Gillmore reported that the

channel across the bar tended to shift southward until it curved in such an oblique angle that the force of the ebb currents began to cut a new channel north of the old one. This continuous process was created by the force and direction of the prevailing winds, the littoral currents, and the surface wave action. Storms, generally bringing winds and currents from the northeast, intensified this process.

After thoroughly examining the tidal action and water volume through the sound, Gillmore concluded that a stable channel of acceptable navigable depth could be provided through the bar only by the construction of jetties. His statement that "the effects that will be produced by jetties upon the entrance to a tidal harbor cannot be ascertained in advance of their construction by any known method with any close approximation to certainty" left the question of jetty construction open to a trial-and-error methodology. The inferior depth of the channel across the bar, the uncertainty as to Fernandina Harbor's commercial growth, the existence along the Georgia coast of more advantageous harbors as refuge from the dangers of the sea or from hostile foreign vessels, and the lack of assurance as to the ultimate results of jetty construction led Gillmore to conclude that the expense of such construction in Cumberland Sound could not be justified.[84]

Congress continued to press the issue of improving Cumberland Sound and in March 1879 directed that a survey be made. Colonel Gillmore, who was in charge of this operation, submitted his report in April 1880. The survey became the basis for the first improvement work in Cumberland Sound. The project was approved and funded by the Rivers and Harbors Act of 1880.[85] The work consisted essentially of constructing two low jetties composed of riprap stone resting on foundation mattresses of logs, or logs and brush, starting from the shores on either side of the entrance to the harbor and extending seaward across the bar. Questions remained, however, as to just what form the jetties should take. The project provided for two low jetties that would be expected to maintain a low-water channel not less than 20 to 21 feet deep, with greater depth being provided by carrying the jetties to higher levels. However, a single long jetty on the north side of the channel and a spur jetty on the south side of the entrance could be expected to provide a low-water channel 16 to 17 feet deep. The difference in cost between these two alternatives was estimated to be approximately $1 million.[86]

In 1881 work began on the construction of the north jetty; construction of the south jetty began the next year. These activities progressed slowly due to inconsistent and insufficient appropriations and unexpected conditions created in the channel as a result of the construction. By 1890 only the foundation course of the two jetties had been laid, and a portion of the second course had been placed on these foundations. The south jetty had been brought up to the level of mean low water for only 3,000 of its more than 10,000 feet.[87]

In 1891 and 1895 District Engineer Oberlin Carter proposed changes in the design of the jetties, which the Board of Engineers endorsed. Neither revision changed the general location of the two jetties, but rather suggested raising and extending the jetties beyond their current dimensions in order to provide a 19-foot channel depth across the bar at mean low water. Moreover, the 1895 proposal also advocated dredging in the channel between the jetties. Congress



*View of the Plaza, Old Fernandina, Florida, showing two buildings which were used by the Corps of Engineers when the Savannah District suboffice was located there. The tower at the left was used to observe the work being done on the north and south jetties c. 1895. (George T. Davis, Amelia Island, Florida)*

provided for the execution of the revised project in the 1896 Rivers and Harbors Act, calling for extension of the two jetties along the lines previously determined, using riprap stone resting on a foundation of brush mattresses. Congress authorized that the work be done under a continuing contract until completed, which made the project eligible for funding through sundry civil acts.[88]

In October 1896 the Corps contracted with the Atlantic Contracting Company for all the jetty work in Cumberland Sound. Operations began in December of that year. With the impending war between the United States and Spain, Congress in May 1897 asked the Secretary of War to provide information concerning the present condition of the harbor and what steps, if any, were needed to keep the harbor entrance open.[89] (Cumberland Sound's proximity to Cuba made it an important port in the event of war.) Captain Carter provided this information, indicating that the project of improvement for Cumberland Sound was incomplete and that the channel entering the sound across the bar still had not been stabilized. The channel that was being used by shipping interests had shifted southward and, indeed, crossed the south jetty about 7,000 feet seaward from the point at which the jetty was attached to the shore. A new channel was beginning to form almost parallel to the north jetty and approximately 1,000 feet from it. This channel had begun cutting itself through the bar in 1895 and was progressing rapidly. Carter recommended opening the new channel further by dredging and raising the height of the two jetties under the existing contract.[90]

Carter had been urging that dredging operations be started and proposed that another contract be granted to the Atlantic Contracting Company. Following convincing arguments by Carter, Congress appropriated funds for such dredg-



*Brush mattresses made of lumber and branches of trees and bushes were sunk and used as an underwater foundation for jetties as they kept the rocks from sinking into the sand. The location and date of the above photograph are unknown. (Savannah District, Corps of Engineers)*

ing in the 1897 Deficiency Appropriation Act.[91] Before the supplementary contract was signed, Carter was transferred to the American Embassy in London as military attache. Captain Cassius E. Gillette replaced him as Savannah District Engineer on 20 July 1897.

Gillette proceeded to Cumberland Sound to inspect the jetty work underway. He quickly concluded that the brush mattresses were of inferior quality and did not meet contract specifications. He then formally accused Carter of improper conduct. A board of inquiry made up of three Engineers investigated the situation, and charges were brought against Carter concerning not only his conduct relating to the Cumberland Sound project, but to work in Savannah Harbor as well. Carter was court-martialed in 1898 and convicted of scheming to secure the Cumberland Sound contract for the Atlantic Contracting Company, which "*did furnish and put into said work* certain mattresses and stone which were different in kind and character from the mattresses and stone contracted for in said contract, *and very much less costly*" to the company. According to the evidence presented, the company defrauded the U.S. government and made a profit of $1,787,509.05 on the contract price of $2,551,000.21 paid for work on 25 miles of jetties and training walls.[92] Carter was dishonorably discharged and sentenced to 5 years in the Fort Leavenworth, Kansas, Penitentiary.

The owners of the Atlantic Contracting Company ceased their jetty work in Cumberland Sound in October 1897. These parties to the Carter case later would be indicted themselves for conspiracy to defraud the government. At the

same time, however, funds for the jetty work had run out even though Congress had appropriated $355,000 for the project in 1896. At the time construction stopped, the company claimed to have done work valued at $613,439.60 and thus asserted that the government owed them the balance of $258,439.60. The Corps faced major decisions as to whether the company should be paid the additional money and whether the Corps was bound to the 1896 contract.

Captain Gillette, in presenting his charges against Carter, recommended that the contract with the Atlantic Contracting Company be voided. Shortly thereafter, the Secretary of War instructed that the entire project be transferred to the Jacksonville District. The District Officer there, Colonel William H.H. Benyaurd, suggested that no action be taken until the Carter case was decided even though Congress had appropriated $450,000 for the project in the Sundry Civil Act of 1 July 1898 and an additional $400,000 in the Sundry Civil Act of 3 March 1899.[93] In keeping with the findings of the Carter case and the conclusion that the contractors did not faithfully carry out the contract in Cumberland Sound, Colonel Benyaurd, Acting Judge Advocate General J.N. Morrison, and Secretary of War Elihu Root all recommended annulling the Atlantic Contracting Company's contract not only at Cumberland Sound but in Savannah Harbor as well. The Corps carried out Root's order, and the company was denied further compensation.[94]

The Carter case not only affected the jetty work in Cumberland Sound, but also jeopardized dredging operations recommended by Carter and approved by Congress. Captain Gillette opposed dredging operations between the jetties, as did Colonel Benyaurd when he was placed in charge. The Chief of Engineers, Brigadier General John M. Wilson, supported Benyaurd's opinion that such operations would be useless at that time in view of the unfinished jetty construction.[95]

The limited jetty work failed to control the movement of sand in the sound, and during the 1890's the sailing channel moved southward and, as already noted, crossed the line of the south jetty. In early 1895 a gap was cut through the jetty to accommodate shipping. Meanwhile, another channel began to develop on the north side of the sound. The repercussions from the Carter affair prevented any significant work for so long that Fernandina citizens began to complain that shoaling was threatening that city's trade. Benyaurd reviewed the project and suggested major changes that included relocating the outer portions of the jetties and improving the channel through the gap in the south jetty. Captain Charles H. McKinstry, who replaced Benyaurd in the Jacksonville District, echoed this recommendation. In 1900 the Corps convened a special Board of Engineer Officers to review the project for modification. The Board agreed with Gillette, to whose command in the Savannah District the project had reverted in June 1900, when he advocated continuing the original plan for the jetties' construction and emphasized the importance of dredging between the jetties to develop the channel forming on the north side.[96]

John W. Griggs, Attorney General under President William McKinley, approved the resumption of work on Cumberland Sound, even in light of the problems with the Atlantic Contracting Company and the civil cases against its owners and Carter. Accordingly, in 1900 the Corps contracted with the Christy, Lowe and Heyworth Company of Chicago to renew jetty construction. Captain

Gillette also recommended that the Corps save on expenses by having a dredge built.[97]

The contractors raised the north jetty to the high-water mark and extended it out to the bar. Some work was done on the south jetty as well. The north jetty was 19,150 feet long, and the south jetty was 11,200 feet long; the crest width of both was 8 feet. A distance of 3,900 feet separated their parallel sections. In describing the successful results, Gillette explained that the enlarged north jetty directed the flow of ebb tide along the path of the new north channel, thus creating a scouring effect.[98] This action soon achieved a north channel through the sound deeper than that across the line of the south jetty. Buoys marked this new line of navigation, and the contractors began to close off the gap in the south jetty. Some dredging was done to supplement the actions of nature — both by contract with Charles P. Goodyear of Brunswick and by hired labor on Government plant, particularly by the new seagoing dredge *Cumberland,* finished in 1903 for this project. The controlling depth in the north channel was 22.5 feet at mean low water, or 3.5 feet deeper than the project called for. In mid-1905 the Corps declared the project completed.[99]

Maintaining and protecting the jetties and the channel depth posed problems for the Engineers. For example, a hurricane in the fall of 1898 had cut a trench across the beach on Cumberland Island. Consequently, seawater flowing through the cut and into Beach Creek to the interior of the island began to threaten the jetties. The Corps' solution was to build a 6,900-foot-long dike running parallel to the beach from the inner end of the north jetty northward to the high ground near the mansion house of Dungeness, an estate owned by Mrs. Lucy Carnegie, widow of Thomas M. Carnegie of Pittsburgh. Within a few




*South front of Dungeness Mansion, built by Thomas M. Carnegie, brother of Andrew Carnegie, on the south end of Cumberland Island in the mid 1880's. The house was destroyed by fire in 1959. (Eloise Bailey, St. Marys, Georgia)*

years, the beach was restored to a width of 500 feet. Because of its proximity, Beach Creek soon threatened to undermine the dike's foundations. To resolve this situation, the Corps dredged a canal, altering the course of the creek and diverting some of its flow away from the dike.

Because the north jetty interrupted the ocean current and southward movement of sand, a shoal began developing on the north side of the jetty. The stones in the structure were rather large; hence, some sand passed through the crevices and caused shoaling on the channel side of the jetty as well. This condition required maintenance dredging of the north channel by such Government dredges as the *Cumberland,* the *Cape Fear,* and the *Winyah Bay.* Settling and storms plagued portions of the jetties themselves, so additional work was needed to raise their levels and to fill in gaps. The jetty maintenance work was done under contract by the Roderick G. Ross Company of Jacksonville, Florida.

The Corps' improvement at Cumberland Sound in the early 1900's provided a ship channel well in excess of the depth specified by Congress. However, due to the nature of the currents in the waterway between the jetties, the channel was not stationary. As already noted, the completion of the north jetty created the so-called north channel, which replaced the earlier channel that had crossed the line of the south jetty. Ships had hardly begun to use the north channel, however, when another channel started to develop along the south jetty with a depth of 24 feet at mean low water in most places, a depth comparable to that of the north channel as of 1907. Moreover, the large shoal between the two channels began moving out to sea. Between 1903 and 1907, it moved 2,500 feet, and the depth increased from less than 6 feet at mean low water to at least 12 feet.[100]

Generally, the Corps was successful in every aspect of this project. However, some people complained that the dredging and jetties were causing harm to the south end of Cumberland Island. C.E. Page was a principal critic. He was manager of Mrs. Carnegie's estate, which included almost all of the island. Page claimed erosion was much more progressive in recent years due to the Engineers' improvements. Elbridge R. Conant, Assistant Engineer in the Brunswick sub-office, responded that while some erosion was taking place, it was "due entirely to a natural cause and this cause is almost, if not entirely, wave action." He added that had the Engineers not built the protecting dike between the jetty and Dungeness, Mrs. Carnegie's property would have been damaged already.[101] The Engineers located and plotted the high-water line in the area and compared it to one located by the U.S. Coast and Geodetic Survey in 1857. According to District Engineer Dan Kingman in 1907, the comparison showed that only a moderate amount of erosion had occurred. He added that "there is nothing whatever to show that the construction of the north jetty has caused any damage whatever to the island."[102]

Typical of river and harbor improvements at this time, work at Cumberland Sound was treated as an isolated project and not in connection with the fact that it served as the outlet to the sea for two port towns: Fernandina, Florida, on Amelia Island and St. Marys, Georgia, near the mouth of the St. Marys River. The latter town was rather insignificant in 1900 in that it had a population of only about 300 people and no transportation connections. Fernandina, on the

other hand, had a population of 4,500 and was served by a railroad.[103] One would assume that the value of any improvements in Cumberland Sound would be tied to similar improvements at Fernandina Harbor, but in fact throughout all of the planning and discussion of the Cumberland project during the late 19th century, Fernandina was not mentioned. Only after the jetty work was well underway in Cumberland Sound did Congress call for a preliminary examination and survey of Fernandina Harbor, with a view toward deepening and widening the channel in front of and a few miles above the town. Writing in support of this project, Colonel Kingman noted:

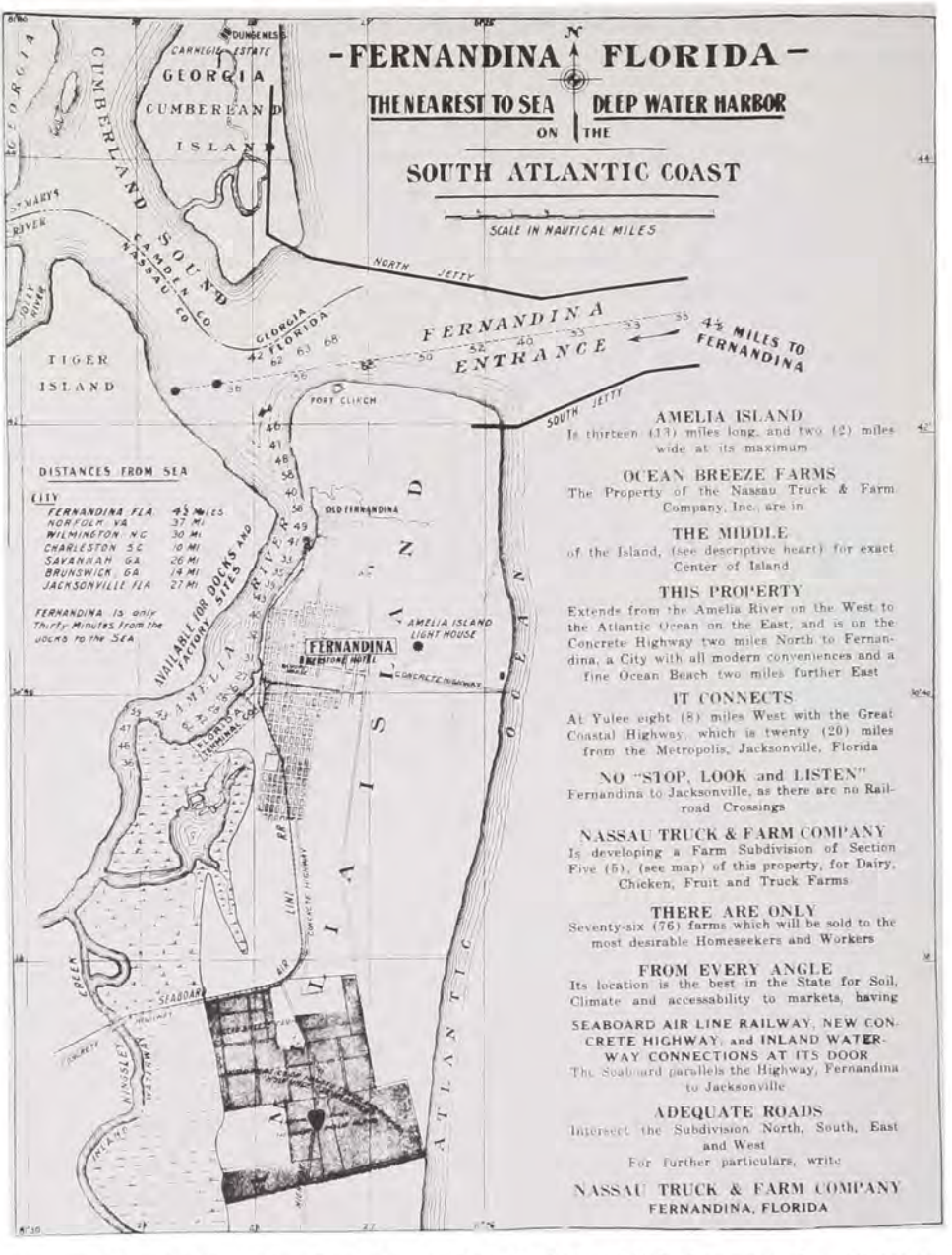
> At present the deep-water wharf frontage of the port is only about 7,000 feet in length. Thruout [*sic*] the balance of the harbor the controlling depths are only 14 to 16 feet at mean low water. The Government has never undertaken any improvement of the harbor of Fernandina, tho [*sic*] some $3,000,000 have been spent in improving the entrance thereto, which now has a low water depth of not less than 24 feet. The deepening of the inner harbor [at Fernandina] is therefore necessary to permit full advantage to be taken of the improved entrance.[104]

Colonel James B. Quinn directed a survey and examination and in 1905 recommended a plan to dredge a channel 400 to 600 feet wide and 20 to 24 feet deep at mean low water along the town's waterfront.[105] With the 1907 Rivers and Harbors Act, Fernandina Harbor became a "special work of improvement" and the *Annual Report* that year listed it for the first time among the Savannah District's projects.[106]

The harbor included the lower end of the Amelia River, which joins Cumberland Sound about 2 miles from the bar. It was approximately 1,300 feet wide and 2 miles long. The depth was generally better than 25 feet at mean low water, but some shoals reduced the controlling depth by 10 or 11 feet. The Corps awarded the contract for dredging operations to the North American Dredging Company, which finished the work in July 1908.[107] Shortly thereafter Colonel Kingman recommended that the work at Fernandina Harbor and Cumberland Sound be combined. The Chief of Engineers agreed, declaring that the only purpose for the improvement of Cumberland Sound had been to give a deep-water entrance to Fernandina Harbor. In the *Annual Report* he proposed merging the two projects into one, which became official by act of Congress in 1910.[108]

Over the next several years, the expanded project required only maintenance work to keep the channels sufficiently deep and to repair the jetties and the dike on Cumberland Island. The seagoing dredge *Galveston,* rented from the Texas District, was used in 1912, as was the *Savannah* in 1914. Such contractors as Roderick G. Ross and George W. Parkhill, both of Jacksonville, Florida, did the jetty repairs. The years during and immediately following World War I, however, saw no Corps' activity in this location due to "deterioration" in the commerce of this port.[109]

The Rivers and Harbors Act of 1920 requested a new preliminary examination and survey of Fernandina Harbor.[110] Because a channel 26 feet deep at mean low water had developed between the jetties and over the bar at Cumberland Sound, Colonel Alstaetter's report recommended extending the 26-foot




*A map of Cumberland Sound and Fernandina Harbor published as part of an advertisement for the area in the early 20th century. Note the location of Dungeness on Cumberland Island, Fort Clinch on the north end of Amelia Island, and Old Fernandina. (George T. Davis, Amelia Island, Florida)*

depth in a channel 40 feet wide from the ocean up to Calhoun Street in Fernandina and then 300 feet wide from that point on to the south end of the Florida Terminal Company's development above the town at the mouth of Lanceford Creek. The Rivers and Harbors Act of 1925 authorized the project, which would extend for 7 miles.[111] The Savannah District office used the government dredge *Congaree* to complete the depth requirements, and the project was

finished in 1927. At the same time, the jetties were repaired under contract.[112]

Many years passed before this harbor received further attention from Congress and the Corps. No dredging was done between the jetties (also called the outer harbor) after 1914, and 1927 saw the last dredging in the inner harbor and the last jetty repairs before World War II. The passage between the jetties remained stable during these years, but the jetties deteriorated badly. In 1935 Savannah District Engineer Major Creswell Garlington recommended major repairs, as did the Jetty Board of the U.S. Engineering Corporation and the Division Engineer in Norfolk, Virginia. The Jacksonville District Engineer supported the repair work as well. However, the work was prevented due to lack of funds, for the Corps' policy became one of committing available monies only to projects most urgently needed in the interest of navigation.[113] Major Garlington proposed applying to the emergency relief program for funds for jetty rehabilitation, but the Corps' request was rejected because the work could not meet the cost per man-year criteria set for projects to qualify for relief funds.[114]

While repairs at the Cumberland Sound jetties were not funded, Congress responded to recommendations by the Savannah District Engineer, the Division Engineer, and the Board of Engineers for Rivers and Harbors concerning modifications to the Fernandina Harbor project. In the Rivers and Harbors Act of 1938, Congress provided for a channel 28 feet deep at mean low water from deep water in the Atlantic to deep water at the Amelia River's junction with Lanceford Creek above the town. The established widths would remain the same, but the Corps was to widen the channel to 1,000 feet at the first bend



*A sailing vessel is loaded with lumber at Fernandina Harbor in 1908 as the steam tugboat* Admiral Dewey *waits along side. (George T. Davis, Amelia Island, Florida)*

below Lanceford Creek to establish a turning basin. Dredging was needed throughout the entire project to obtain the specified depth and to form the turning basin. The work was completed in 1940.[115] In the meantime the jetties went unrepaired.

In the early years of improvement, Fernandina Harbor and Cumberland Sound were significant in the commerce of southeast Georgia and northeast Florida. The goods passing through this port were typical of the region, namely lumber, naval stores, and phosphate rock.[116] These years were the best years for the harbor in overall tonnage as well as value of commerce passing through the port, for indeed, this was a period when smaller harbors still played a role in the movement of goods. World War I saw a major decline in the commerce of Fernandina Harbor because a majority of its trade had gone to foreign ports.[117] During the late 1920's there was an upswing in both tonnage and value due to expansion of the area's seafood industry. But the port never regained the importance of its earlier years. The Depression era witnessed a further decline in commerce, and the defense needs of World War II further delayed funding and improvement.




*Sail and steam vessels are loaded with naval stores at Fernandina Harbor c. 1910. (George T. Davis, Amelia Island, Florida)*

# 8 THE INTRACOASTAL WATERWAY

While many of the Savannah District's river and harbor projects benefited local interests only, others offered regional advantages as well. Two examples were the projects on the Altamaha system and in the Savannah Harbor. None were of such national importance, however, as the coastal Inside Water Route, which was included later in the Atlantic Intracoastal Waterway.

The United States experienced a marked revival of interest in waterway improvement from the 1890s up through World War I. The two most prominent projects proposed were those for a deep channel from Chicago to the Gulf of Mexico via the Illinois and Mississippi rivers and for a deep-water intracoastal route from Boston to the Rio Grande River. This second waterway would take advantage of the bays, inlets, and tidal creeks joined by dredged cuts and a cross-Florida canal.[1] Because of its responsibility for improvements along the Georgia coast, the Savannah District helped develop the project.

To a greater extent, a natural inside water passage existed from Savannah to Jacksonville, Florida. However, the marsh creeks, tidal rivers, and sounds presented various obstacles to navigation along this route. At first Congress viewed the Intracoastal Waterway development in Georgia as a number of individual projects, each to be authorized and funded separately. As one observer has noted, "The project grew incrementally, as have most Corps of Engineers' waterway development projects."[2] Eventually, the Atlantic Intracoastal Waterway evolved into a single system as Congress and the Corps recognized the wisdom of integrating the separate projects.

Prior to 1890 the projects that comprised the work on what was later to be known as the Intracoastal Waterway included improvements on St. Augustine Creek, east of Savannah; Romerly Marsh, southeast of Skidaway Island; Jekyll Creek, west of Jekyll Island; and a waterway extending between Fernandina and the St. Johns River in Florida, which was usually referred to as the "inside passage."

The first post-Civil War funds for the waterway from Fernandina to the St. Johns River resulted from the Rivers and Harbors Act of 1874, which appropriated $10,000 "either to the improvement of the mouth of the St. Johns River or to dredging out the inside passage between the St. Johns and Nassau Inlet." In addition, part of this money was used to survey the inside passage in preparing for a project between the St. Johns River and Fernandina.[3] Almost three-

fourths of the 1874 appropriation was spent in dredging at various locations along this passage. The Corps' work was suspended, however, between 1876 and 1879 because of lack of further appropriations, and considerable shoaling occurred in the channels previously dredged.[4] The project for this passage called for a channel 11 to 13 feet deep at high water and 80 to 125 feet wide. The project's estimated cost varied from $160,000 to $370,000, but in addition to the 1874 appropriation of $10,000, Congress made grants of only $7,000 each in 1879 and 1880.[5] With these meager funds, adequate dredging could not be carried out, and by 1881 all work had halted. Aside from the limited funding, Quincy Gillmore, the supervising Engineer, noted that the work was suspended also because recent improvements in rail service from Fernandina to Jacksonville and Savannah had negated the urgent need for a waterway.[6]

In the Rivers and Harbors Act of 1879, Congress appropriated $5,000 to improve St. Augustine Creek, also known as the Thunderbolt River. This amount was for the purpose of removing a heavy timber drydock that had been sunk in the channel during the Civil War. This obstruction was in the stream about a mile from its confluence with the Savannah River.[7] John G. Smith of Charleston was awarded the contract for removing this obstruction. After the work was completed in September 1880, the Engineer stated that "there appears to be no necessity at present for any further improvement of the river at this point, and no other appropriation is asked."[8]

The water route through Romerly Marsh, later called Parson's Cut, was designated in the 1887 *Annual Report* as likewise forming "a part of the inland passage from the Savannah River, Georgia, to the Saint Johns River, Florida."[9] This location, which lies southeast of Skidaway Island between Wassaw Sound on the north and Ossabaw Sound on the south, was first reported on in November 1880. In that report Gillmore suggested four possible alternative routes that might be followed to improve passage through this section, since the current route was said to be "exceedingly crooked" and difficult to navigate. In many places the mean low-water depth did not exceed 4 feet, and in others it was no more than 3.5 feet.[10] Two years later Congress provided funds to improve the route, which was designated as "route numbered 4." It ran from Wassaw Sound via Dead Man's Hammock Creek, which was to be connected by a cut to Wassaw Creek; Wassaw Creek itself; and Odingsell River on to Ossabaw Sound. This Parson's Cut route was more than two miles longer than that presently used, but was said to be more navigable.[11]

The plan of improvement called for dredging at several locations to provide a depth of 7 feet at mean low water and a minimum bottom width of 48 feet. The Corps began operations in May 1883 and continued intermittently until the following September, when lack of funds brought a halt to the work. Congress appropriated an additional $10,000 the next year. When these funds were exhausted, the Corps suspended work in September 1885. Private individuals completed the work in April 1886 and were reimbursed by acts of Congress in August of 1886 and 1888.[12] The project was examined in the summer of 1890. The examination revealed that the banks of one of the cuts through the marsh were caving in at several points and considerable shoaling had occurred.

Jekyll Creek is that part of the Intracoastal Waterway that flows along the western side of Jekyll Island between St. Simons Sound and St. Andrews

Sound. It is about five miles long and connects with the Brunswick River in St. Simons Sound about six miles east of Brunswick. The primary obstacles to navigation were two shoals near the northern end of the creek that brought the effective mean low-water depth of the channel to approximately 3.5 feet. In 1886 two steamships and numerous sailing vessels were reported to be regularly using this channel. Because of the shoals and shallow depth, at low water these vessels had to be towed through Jekyll Creek. Colonel Gillmore pressed for a project to deepen the waterway. He maintained that because the Romerly Marsh channel had been completed recently, providing a depth of 7 feet at mean low water, Jekyll Creek, also a section of the natural inland passage along the Georgia coast, "should be similarly improved."[13]

Following an initial survey of the creek authorized in 1880, the 1886 Rivers and Harbors Act called on the Corps to do another study.[14] The Savannah District office did so and submitted a project for the improvement in October 1887. The features of this recommended project included building a training wall at the mouth of the creek designed to concentrate the ebb currents across the mud shoal to the deep waters of Brunswick River; dredging through the shoals and mud flat that obstructed the channel; and closing the mouth of a small river that emptied into Jekyll Creek to prevent the escape of water through that branch at ebb flow. The channel that was to be established by this project was to be 7 feet deep at low water and 50 feet wide at the bottom. The Rivers and Harbors Act of 1888 provided $5,000 for the project. Initial work was done during February and March 1889, when funds ran out.[15] Intermittent dredging and training wall construction were continued due to limited additional funding by Congress in 1890, 1892, and 1894. However, the project remained incomplete for many years.[16]




*The steamboat* Alpha *made the run between Savannah and Port Royal, South Carolina, along the Intracoastal Waterway. n.d. (Ruby Rahn Collection, Coastal Heritage Society)*

The Rivers and Harbors Act of 1894 included in the appropriations for Savannah Harbor a survey for a steamboat channel 7 feet deep at mean low water between Beaufort, South Carolina, and Savannah.[17] This channel formed a part of the Inside Water Route between Charleston and Savannah and would be incorporated later into the Intracoastal Waterway program. Following the survey, Captain Oberlin Carter, Savannah District Engineer, submitted the report in 1895.[18] Carter indicated that two routes might be improved for a steamship channel of the required depth. The first route was determined to be the least expensive and the most direct but, according to Carter, would harm the channel in Savannah Harbor because of the changes it would cause in tidal flow and silting. The second route would be five miles longer and 25 percent more expensive but would not only provide the required steamship channel "not liable to deterioration," but would also "benefit the harbor of Savannah by throwing a great part of the volume of Wrights River into the channel across Tybee Knoll." This route, therefore, was recommended even though commercial and navigation interests in the region preferred the first one. Congress approved Carter's recommendation in the Rivers and Harbors Act of 1896 and provided that the improvement work on the steamboat channel could be performed through continuous contracts.[19] This decision caused some controversy for the next several years.

In 1897 Cassius E. Gillette, who had succeeded Carter as Savannah District Engineer and who had been instrumental in his court-martial, criticized Carter's survey and stated that the project as proposed was "almost certain to prove a total failure." He further recommended that the improvement of the channel through the second route be abandoned and a third route, recommended by Gillette himself, be considered.[20] This idea was complicated by the fact that the second route had been adopted through the Rivers and Harbors Act of 1896 and contracts had been let already for dredging and jetty construction. However, the Chief of Engineers had not recommended the project nor had it been referred to a Board of Engineers for review.

Wilson convened a Board of Engineers in September 1898 to examine the route between Beaufort and Savannah and to suggest any necessary changes.[21] This board recommended that the first route, from Wrights River through Mud River, be substituted for the unfinished section of route number two. Wilson, however, recognized that because Congress had specified the route to be followed for the steamboat channel, no modifications could be made without congressional consent.[22] The issue was further confused by the court-martial proceedings against Captain Carter. General Wilson requested clarification on two points. First, he wanted to know if the testimony in the Carter trial revealed any fraud by the contractors and, if so, whether the contracts were illegal. Second, he wanted to know if the contractors should be notified to proceed with the work in the event the contracts were recognized as valid.[23] The later adoption of the enlarged Intracoastal Waterway project finally resolved this controversy.

As a result of the Rivers and Harbors Act of 1890, the Savannah District Engineers surveyed the entire Georgia coastal region to determine a route for a channel 7 feet deep at mean low water from Savannah to Fernandina. Based on the subsequent report, Congress authorized a 7-foot channel in July 1892 and

called for improvements at Romerly Marsh, Mud River on the west side of Sapelo Island, Little Mud River to the west of Wolf Island, and Jekyll Creek. The law authorized dredging operations as well as the construction of closure dams and training walls of brush mattresses loaded with riprap.[24] In the 1892 act Congress and the Corps began to envision a single improvement encompassing the entire Georgia coast rather than the localized projects typical of earlier decades.[25] However, the Savannah District project for an Inside Water Route was still composed of individual undertakings only later united into a single effort.

The Corps' work progressed slowly, but most of the blame fell on Congress because of funding delays. The Corps had anticipated originally that the 1892 project would cost $105,000, based on the assumption that Congress would provide the full amount at one time. Instead, Congress gave the Savannah District office only partial funding over a 13-year period. The final appropriation, $41,000, came in the 1905 Rivers and Harbors Act. Colonel James B. Quinn, District Engineer at that time, reported that the limited allotments provided only for dredging a few narrow channels that shoaled rapidly.[26] This activity include dredging by contract in Jekyll Creek and Mud River, as well as at "The Dividings" in the Cumberland River. At the same time Parson's Cut, the 1880s channel through Romerly Marsh, filled in. This left a depth of only 3.5 feet at mean low water. The project was but 55 percent complete in 1905, 13 years after initial approval.[27]

After reviewing the project in 1905, Colonel Quinn stated that it could not be completed at the originally estimated $105,000 because first, the piecemeal appropriations had caused excessive delays. Second, additional expenses now would be incurred due to the filling in of some channels that originally did not need work. Third, he recommended that the project be expanded to provide a channel 10 feet deep at mean low water and between 150 and 200 feet wide along



*The steamboat* Hildegarde, *built in 1898, sailed along the Intracoastal Waterway from its home port of St. Marys. n.d. (George T. Davis, Amelia Island, Florida)*



*The steamboat* Emmaline *was a familiar sight along the Intracoastal Waterway as it made regular trips between Brunswick, its home port, and Fernandina. n.d. (George T. Davis, Amelia Island, Florida)*

the entire route. Such a plan would require an additional $50,000 for "restoration of dredged channels" and dredging of recently formed shoals, plus $10,000 annually for maintenance.[28]

Quinn focused attention on the proposed waterway's importance to commerce and as a safe route for torpedo boats and other such naval craft.[29] Over the next two years the Corps carried on the project with the 1905 appropriation. Under contracts, P. Sanford Ross (Incorporated) dredged at The Dividings in Cumberland River, Jekyll Creek, Mud River, and Little Mud River; and Roderick G. Ross of Jacksonville, Florida, constructed and repaired a jetty at the mouth of Jekyll Creek.[30]

Because the passage through Parson's Cut suffered excessive shoaling, Congress in 1890 called on the Corps to do a preliminary examination and survey of an alternative route in the area of Wassau and Skidaway islands. This site, Skidaway Narrows, was "a narrow, tortuous waterway formed by two creeks which united at their heads at the meeting place of the tides, connecting Burnside River with Skidaway River [also known as Isle of Hope River]." Congress contemplated a channel 75 feet wide and 6 feet deep at mean low water.[31] The length of "the narrows" was only about one-half mile, but the two-mile improvement project would require dredging in the upper regions of both major rivers.[32]

District Engineer Gillette filed a report later that year opposing the improvement on the grounds that local commerce was not significant enough to justify a project and that other routes were available for those small vessels using Skidaway Narrows.[33] The entire hierarchy of the Corps of Engineers and Secretary of War Root agreed with Gillette. However, Congress apparently did not, for in the 1902 Rivers and Harbors Act, it required that another survey be made



*The steamboat* Hessie *operated between Brunswick, its home port, and Darien to the north via the Intracoastal Waterway. n.d. (C. S. Tait, Sr., Collection, Brunswick, Georgia)*

of this narrow channel, which in fact was navigable by small sailboats and launches only at high water.[34]

In this latest survey, Colonel Quinn recommended a channel 6 feet deep and 75 feet wide. An improved passage through Skidaway Narrows, he claimed, would shorten the distance of the Inside Water Route to Fernandina by 6.5 miles over that of the route via Parson's Cut and Wassaw Creek and would provide a more inland and therefore safer passage both in terms of natural dangers and wartime threats. However, he also recommended as "more economical, direct, and better located," a route through the marsh somewhat to the west of the narrows. The Board of Engineers for Rivers and Harbors rejected Quinn's proposal. According to the board, the Skidaway Narrows route would compete for commerce with the established route by way of Parson's Cut, which they maintained was as short and cheap as Quinn's suggested route and was "more favorable to navigation."[35] The Chief of Engineers upheld the opinion of the board, but Congress took the advice of the Savannah District Engineer. The Rivers and Harbors Act of 1905 provided for Quinn's recommended improvement as a separate project.[36]

A problem in acquiring the necessary right-of-way through private property west of Skidaway Narrows ultimately compelled the Corps to follow a route through the narrows proper. Dredging was contracted out to Wayne Cunningham of Savannah, who began operations in October 1905. Once again, however, Congress failed to provide sufficient funds to complete the work all at one time. Hence, the initial work through the narrows was not of immediate benefit because shoals at either end blocked passage into the Burnside and Skidaway rivers except at high tide.[37] Congress provided additional funding in 1907, which permitted renewal of dredging operations to carry the channel to




*A 1907 map of Skidaway Narrows, site of a project approved by Congress in 1905, and eventually made part of the Intracoastal Waterway. (Savannah District, Corps of Engineers)*

full project dimensions from deep water to deep water in the respective rivers. The Corps awarded the contract to the Savannah Dredging Company. It completed the work in late fall 1908, providing a waterway 6 feet deep at mean low water and 75 feet wide in the straight sections and 90 to 200 feet wide at bends. The full length of the project was 2.75 miles.[38] With the completion of the Skidaway Narrows project, this water passage became a part of the Inside Water Route, although unofficially. Moreover, as the Board of Engineers for Rivers and Harbors had envisioned, commerce quickly deserted Parson's Cut for this shorter and more protected route.

While the Skidaway Narrows project was under way, the Savannah Engineers were involved in another improvement along the Inside Water Route. The 1902

Rivers and Harbors Act had called on the Corps to survey Club and Plantation creeks near Brunswick. The Corps was to ascertain the possibility of providing a protected water route between the Altamaha River and Brunswick Harbor bypassing the rough waters of St. Simons Sound.[39] Both creeks meandered through the salt marshes east of Brunswick, and at one place only about 700 feet of marsh separated them. Club Creek flowed into Back River, which formed part of the natural inside waterway that led north to the Altamaha River, while Plantation Creek was connected with the Brunswick River. Thus, a cut between the two creeks would give a safe passage for commerce between the Altamaha River system and the port at Brunswick. While he was District Engineer, Captain Gillette asserted that "the trifling amount [of money] needed for this improvement would probably give greater proportional benefits to navigation than almost any appropriation carried by the [1902 Rivers and Harbors] bill."[40]

Colonel Quinn submitted a favorable report based on Assistant Engineer James H. Bacon's preliminary survey, and his comments were well received by his superiors. The report included estimates for both a 5-foot and 7-foot channel, but Quinn recommended the 7-foot channel, since he declared that "there may occasionally be conditions which will render this route a desirable portion of the inside route between Savannah and Fernandina."[41]

Congress finally approved this new project in the 1907 Rivers and Harbors Act. This act and legislation in 1910 appropriated the full estimated cost of $40,000.[42] The Corps contracted the work to the Savannah Engineering and Construction Company, which finished it in October 1911. The completed waterway included a passage four miles long, 7 feet deep at mean low water, 50 feet wide through the canal connecting the two creeks, and 75 to 100 feet wide at turns. The project included dredging the canal, straightening and deepening Plantation Creek, and building a small cutoff dam across the former route of Plantation Creek.[43]

These smaller, individual improvements along the Georgia coast contributed to the concept of the Inside Water Route. However, they were not as yet officially part of the project as approved in 1892.

The 1907 Rivers and Harbors Act supplied additional funding for maintenance work along the approved route of 1892. This provided for additional dredging and training wall repairs at the locations already noted, as well as for dredging in areas not specified in the 1892 act but considered important to the overall Inside Water Route. In the same act Congress called on the Corps to do a new survey of the entire coastal region to determine the best possible route through the tidal sloughs and inlets for a waterway from Savannah to Fernandina.[44] Colonel Kingman supervised the survey and submitted a report in 1908. He recommended abandoning Parson's Cut through Romerly Marsh in favor of the Skidaway Narrows route under construction and including both Skidaway Narrows and the Club and Plantation creeks projects in the approved route. He emphasized that no more separate appropriations should be made for these individual waterways.[45]

Kingman also proposed changing the passage via Mud River and New Teakettle Creek to one using Front River and a cut (later called Creighton Narrows) through the marsh to South Sapelo River and Old Teakettle Creek leading to

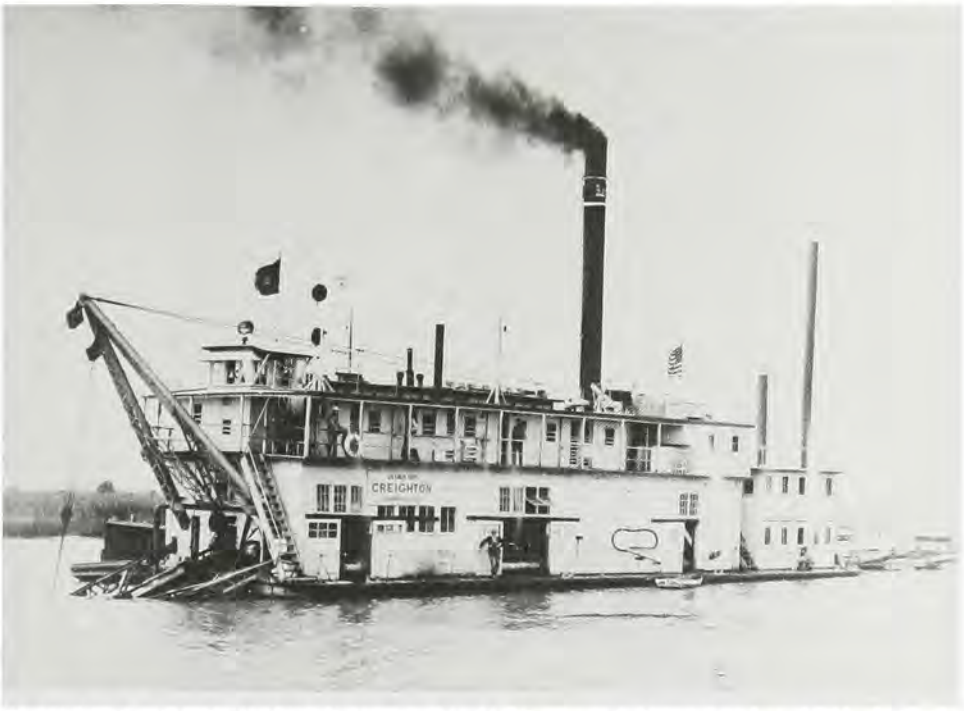
Doboy Sound. He was especially eager to remove Mud River from the approved route, describing it as "a section very difficult and expensive to maintain, analogous to a bog or undesirable mud hole in the midst of a highway." "The best means of maintaining the route," he added, "is to make a detour around it."[46] In addition, Kingman proposed developing a protected route via the marshes and creeks, which would permit boats to bypass the rough waters of St. Simons and St. Andrews sounds. The original recommendation specified a waterway 7 feet deep at mean low water and 150 feet wide at the bottom. However, Kingman proposed reducing the bottom width to 100 feet.[47]

Congress included most of Kingman's recommendations in the Rivers and Harbors Act of 1912. The Skidaway Narrows and Front River-Old Teakettle Creek routes were incorporated into the approved route, and provisions were made to add the Club and Plantation creeks passage as well when previously authorized funds ran out. Moreover, work on additional channels was provided for, including a 3-mile cut near Darien and an alternative passage around St. Simons and St. Andrews sounds. These changes shortened the distance from Savannah to Fernandina from the earlier project's 160 miles to 151 miles. Congress, however, differed with the Savannah Engineer on project dimensions in that the lawmakers specified requirements for a main route 7 feet deep and 150 feet wide throughout, although the St. Andrews-St. Simons Sounds bypass was required to be only 3 feet deep at low water.[48] Because of the work already done, Colonel Kingman pronounced the waterway to be approximately 90 percent complete when Congress approved the new project.[49] The Club and Plantation creeks project was made part of the Inside Water Route in 1911, and the Savannah District Engineer no longer listed it as a separate project after the 1916 *Annual Report.*

Over the next few years the Savannah District office contracted dredging work out to private firms such as P. Sanford Ross (Incorporated) and Simons-Mayrant of Charleston, which also dredged at Brunswick Harbor. At the same time, the training wall and jetties on Jekyll Creek were raised and repaired under contract. The Corps also employed hired labor on government dredges. The Savannah District office meanwhile obtained right-of-way through the marsh between Front River and Old Teakettle Creek, and the Creighton Narrows Cut was begun.

In the 1914 *Annual Report,* the project of 1892 was declared complete. Although the project width had not been achieved at some locations, the required dimensions had been established at all places specified for improvement by Congress.[50] In addition, an alternative route through Three-Mile Cut near Darien was completed, as was the one around St. Andrews Sound following a route that left the Brunswick River at Cedar Hammock and followed Cedar Creek, Jointer Creek, Jekyll Sound, the Little Satilla River, Umbrella Cut, Umbrella Creek, Dover Cut, Dover Creek, the Satilla River, Todd Creek, and Floyd Creek to the Cumberland River. In addition, the Inside Water Route project received its own 12-inch pipeline dredge, the *Creighton.*[51]

The project for a protected Inside Water Route was evolving from one of a little dredging or training wall construction to an integrated network of improved natural waterways joined by man-made cuts. During the World War I era, the length of the project was expanded as well. The District Engineer had




*The U.S. pipeline dredge* Creighton *used by the Savannah District in Sapelo Harbor and along the Intracoastal Waterway in the early 20th century. (Savannah District, Corps of Engineers)*

begun to recognize that the Savannah-to-Beaufort section, long considered part of the Savannah Harbor project, was more logically an extension of the Savannah-to-Fernandina project. This waterway had been completed by the Engineers in 1900, and funds for later dredging had come through allotments for Savannah Harbor improvement. In 1912 and 1913 the accounting for these expenditures was finally kept separate from that of the harbor, and in 1915 District Engineer Colonel Langfitt suggested to the Chief of Engineers that the inland waterway project should be separated from that for Savannah Harbor.[52] Congress recognized the validity of such arguments when the 1917 Rivers and Harbors Act combined the Savannah-to-Beaufort and the Savannah-to-Fernandina channels into one project. At the same time, Congress assigned to the Savannah District the 29-mile Inside Water Route between Fernandina and the St. Johns River in Florida, completed in 1915 and previously in the charge of the Jacksonville District. This established the new project, "Waterway Between Beaufort, S.C., and St. Johns River, Fla.," under the Savannah District.[53]

Under this project the Savannah Engineers were responsible for providing and maintaining a channel 7 feet deep at mean low water with bottom widths of 100 feet in "confined waters" and 150 feet in open water following a route including the "special localities" of Ramshorn Creek, Wrights River, Mud River, Skidaway Narrows, Creighton Narrows, Three-Mile Cut, Little Mud River, Back River, Club and Plantation creeks, Jekyll Creek, Kingsleys Cut, Gunnisons Cut, and Sisters Creek. They also had charge of the 3-foot deep



*William C. Langitt, Savannah District Engineer between 1914 and 1916. (Savannah District, Corps of Engineers)*

bypass channel around St. Simons and St. Andrews sounds. The project was to be executed by dredging and by constructing training walls as needed.[54]

As early as 1912 the Savannah District was called on by Congress to survey Terry Creek and Back River near Brunswick with the goal of dredging a channel 17 feet deep at mean low water.[55] The improvement of these waterways was sought primarily by owners of two sawmills on Back River and three factories on Terry Creek. Colonel Kingman supervised the survey, which led to a report opposing such improvements as being too localized in value to warrant federal expenditures. However, Kingman's report did support the deepening and widening of Back River to 7 feet and 150 feet, respectively. He believed that such an improvement would enhance the river's potential as part of the Inside Water Route. Congress finally authorized the 7-foot channel in the Back River in the 1919 Rivers and Harbors Act, making it a link between the Mackay and Brunswick rivers by way of the improved Club and Plantation creeks. At the same time, the law provided for the removal of logs and other obstacles to navigation from General's Cut, a short length of waterway across General's Island connecting the Butler and Darien rivers. Savannah District recommended this as a project in 1914.[56]

All of the newer additions to the Intracoastal Waterway were in the original Savannah-to-Fernandina section. This, coupled with the fact that the full 150-foot project width had not been achieved, necessitated additional work on this

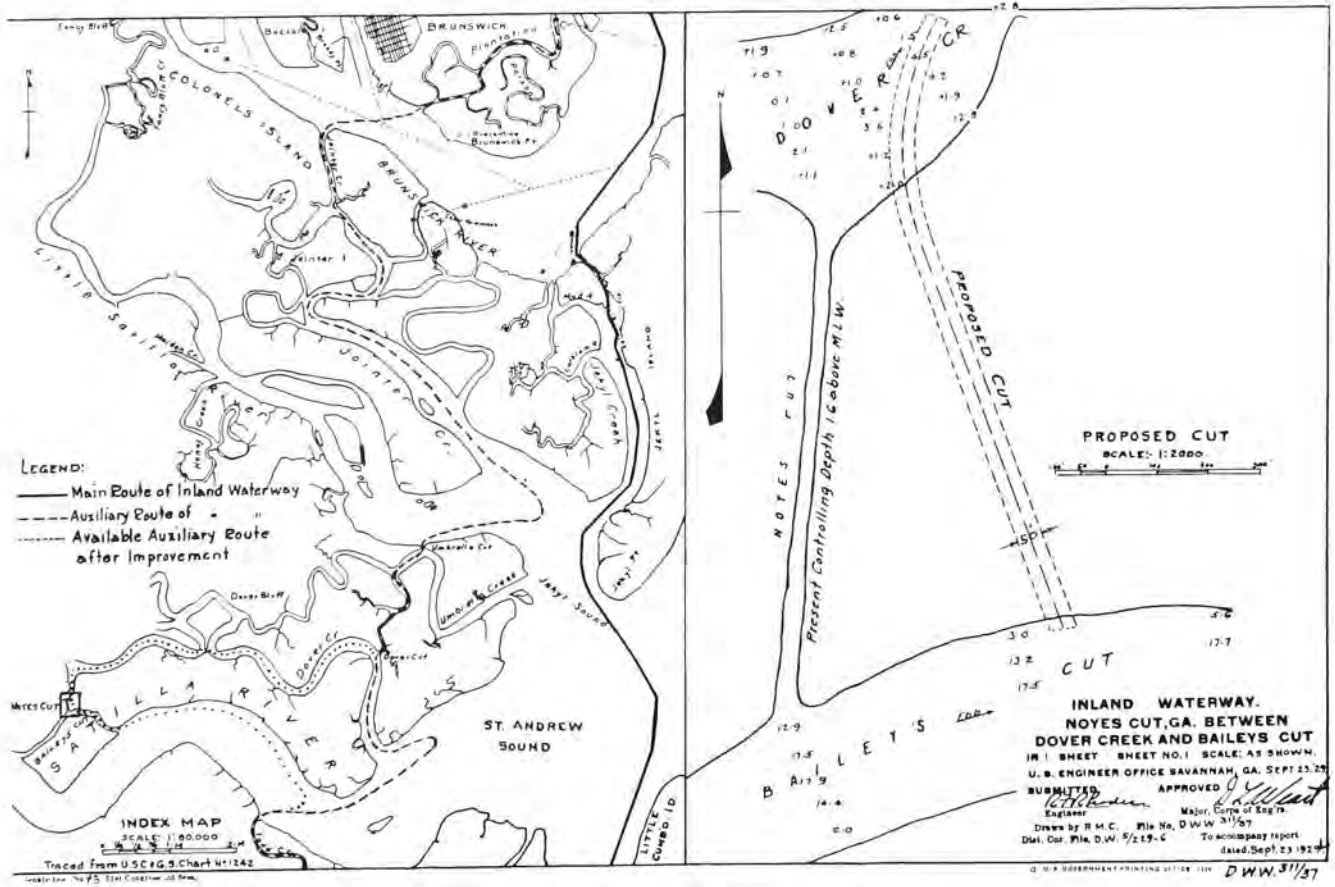
part over the next several years. The Corps used government-owned plant such as the snagboats *Oconee, Tugaloo,* and *No. 1* and the pipeline dredges *Augusta* and *Creighton,* all manned by hired labor, for channel maintenance and new work. The finished project included the 7-foot depth throughout the waterway with a width not less than 75 feet between Beaufort and Savannah (the reduced width called for by the Rivers and Harbors Act of 1925), and a width of 150 feet in the middle section and 100 feet from Fernandina south to the St. Johns River.[57]

Although the Intracoastal Waterway along the Georgia coast was completed officially in 1926, it continued to change and expand. For example, the 1930 Rivers and Harbors Act authorized a channel connecting Baileys Cut (a few miles up the Satilla River) with Dover Creek, thus providing a still more protected route for small craft around St. Andrews Sound. As early as 1910 local citizens had dredged a passage at this location, called Noyes Cut, and several years later had called on the government to enlarge it. Congress had provided for a preliminary survey for such an improvement, which was supervised by Colonel Langfitt. His report had considered the dredging of a new passage east of Noyes Cut, but the proposal was disapproved.[58]

When in 1928 local interests again urged Congress to require the improvement of this channel, the Savannah District office was directed to review the earlier report. Based on the Engineers' new report, Congress authorized a channel 5 feet deep and 50 feet wide connecting Baileys Cut with Dover Creek.[59] The Savannah District office completed this small project by contract in January 1932. That same year the District became responsible for maintaining the section of the Intracoastal Waterway from Coosaw River, South Carolina, to Beaufort, South Carolina, a strip of waterway formerly included in the Charleston-to-Beaufort project.[60] Maintenance dredging was done throughout the post-1926 years by hired labor working on government-owned dredges such as the *Creighton* and *Congaree* and the U.S. tub *Brannan.*

Despite the existence of the protected route around St. Andrews Sound at a depth of 3 feet at mean low water, local interests began to push for expanding this waterway to dimensions comparable to those of the full Intracoastal Waterway. The Senate Committee on Commerce instructed the Corps to review the 1912 report concerning the Savannah-to-Fernandina section, which had originally provided for the bypass around the sound. The Savannah District office recommended further improvements for a protected channel 7 feet deep and 75 feet wide; and the Division Engineer, the Board of Engineers for Rivers and Harbors, and the Chief of Engineers concurred.

The geography of the area offered three possible routes. The Corps selected the one that followed much the same route as the existing waterway. This route went from the main channel in Jekyll Creek through Jekyll Sound and up the Little Satilla River to Umbrella Cut, then through this cut to Umbrella Creek and on through the south branch of this creek to Dover Cut and Dover Creek. From this point it passed along a cut to be made through the narrow neck of land to the Satilla River and across the Satilla River into a cut made around Todd Creek and Floyd Basin into Floyd Creek. The waterway then joined the Cumberland River, where it became part of the main route. The report called on local interests to provide the rights-of-way and easements, and the Board of




*Map of Noyes Cut between Dover Creek and Baileys Cut on the Intracoastal Waterway, 23 September 1929. (S. Doc. No. 43, 71st Cong., 2d Sess.)*

Engineers recommended that the existing 3-foot passage be abandoned in Jointer Creek, Todd Creek, and Floyd Basin.[61] Congress approved this project in the 1937 Rivers and Harbors Act. The Corps once again resorted to contract dredging, and the protected channel around St. Andrews Sound was completed in 1939.[62]

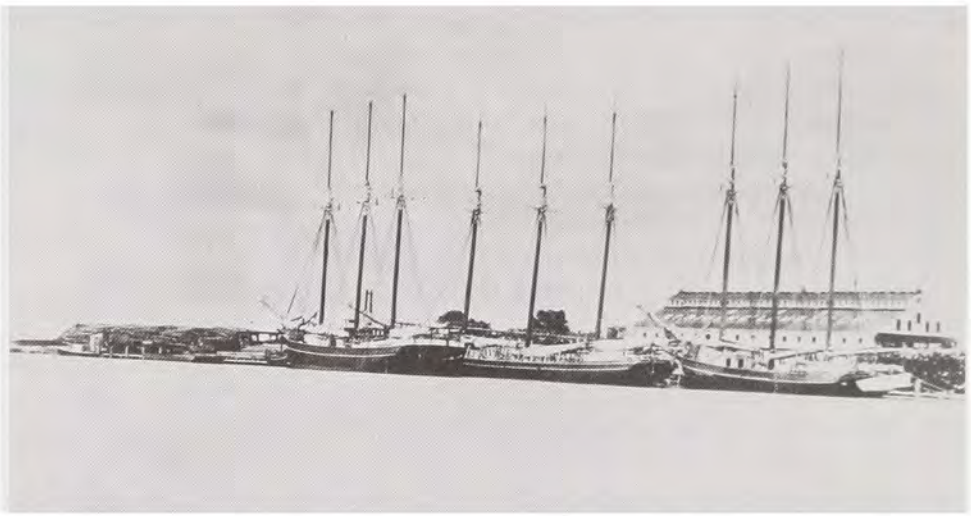
Since 1917 the Savannah District had been in charge of developing and maintaining the 7-foot Intracoastal Waterway from Beaufort, South Carolina, to the St. Johns River in Florida. During the Depression, the Savannah Engineers received a new charge to deepen the waterway but saw the extent of the project under their control reduced. For example, in 1934 the length from Fernandina to the St. Johns River, a section totally within Florida, was returned to the Jacksonville District. The justification was that this section was closer to Jacksonville than Savannah. In fact, the depot where the Jacksonville District based its dredging equipment was located in Mayport at the mouth of the St. Johns River, approximately one mile from the project.[63]

Congress also called on the Corps to deepen the waterway from 7 feet to 12 feet, but authorized the work in the full Beaufort-to-Fernandina sector in two different pieces of legislation. First, at the time Congress provided for the 7-foot protected route around St. Andrews Sound, it also authorized expanding the channel between Beaufort and Savannah to 12 feet deep at mean low water and to a minimum width of 90 feet in the Beaufort River and Port Royal Sound.[64] In June 1938 Congress authorized the 12-foot channel from Savannah to Fernandina, with widths ranging from 90 feet in land cuts and narrow waters to 150 feet in open water, and following basically the earlier established route.



*A steamboat tied up at St. Simon's Island's Frederica Dock on the Frederica River, a part of the Intracoastal Waterway until this section was later replaced by MacKay River as part of the principal route. n.d. (Coastal Georgia Historical Society)*

This law provided for the last major improvements in the Georgia section of the Intracoastal Waterway. A 12-foot depth here would provide a uniform depth all the way from Norfolk, Virginia, to Jacksonville. The 1938 law also made a few changes in the route. It incorporated part of Mackay River near Brunswick into the principal route, thereby replacing a section of Frederica River.[65]



*The St. Simons Lumber Mills on the Frederica River, part of the Intracoastal Waterway. This site is now occupied by Epworth-by-the-Sea. n.d. (Coastal Georgia Historical Society)*



*Highpoint Wharf on Cumberland Island where steamboats traveling along the Intracoastal Waterway between Brunswick and Fernandina docked to load and unload passengers and freight. Note the railroad tracks on the pier; an open, horse-drawn railroad car went all the way out to the end of the pier to pick up or let off passengers and baggage from the Cumberland Island Hotel. n.d. (Eloise Bailey, St. Marys, Georgia)*



*The Cumberland Island Hotel, a popular tourist resort in the early 20th century. Passengers arrived via steamboats traveling along the Intracoastal Waterway. Note the end of the horse-drawn railroad car at the right which carried visitors and baggage and freight to Highpoint Wharf. (Eloise Bailey, St. Marys, Georgia)*

The Corps' development of the Intracoastal Waterway was related to the economic value of the commerce passing over it. In the early years of the project, the principal items were lumber products and naval stores carried on barges, tow lighters, small schooners, and steamboats, as well as timber, which was rafted or towed in rafts from the various rivers to Savannah, Brunswick, or Fernandina. Pleasure craft also used the waterway. However, rarely did any of the traffic use the entire length. Instead, vessels tended to move from Savannah northward, between Savannah and the Altamaha River, between Darien and Brunswick-St. Simons Island, or from Brunswick southward to Fernandina and back again. As a result, local interests prevailed on Congress to authorize and fund individual improvements along the Georgia coast. After the Corps carried out the work, each project provided part of the full length of a protected Inside Water Route. According to the Corps, the improvement facilitated "the waterborne commerce in vessels of moderate size by straightening, widening, and deepening the natural channels, thus making navigation safer and easier, and by shortening the route by dredged cuts."[66]

During the 1920s the waterway experienced a significant increase in commerce, with the value of commodities reaching $25,175,300 in 1926.[67] After the stock market crash in 1929, the total tonnage declined to a low of 109,911 tons valued at $3,927,580 in 1934.[68] However, commerce improved in the following years, justifying the project's expansion in the 1938 Rivers and Harbors Act. By this time the products shipped over the waterway included such items as vegetables and other food products, coal, petroleum products, oyster shells, hay,

machinery, chemicals and fertilizers, and automobiles, as well as wood products. Commercial interests sought the increased depth to accommodate larger vessels with a greater carrying capacity. The possibility of more and larger pleasure craft using the waterway further supported the call for a deeper channel.

# 9 MILITARY ACTIVITIES

At the close of the Civil War, the nation's coastal defenses were reevaluated. Military technology had advanced beyond the state of smooth-bore artillery, wooden-hulled ships, and masonry forts. Although some of the new technology had been demonstrated during the Civil War, in 1865 American military development had far to go in competing with the industrialized European nations. Former Secretary of War Lewis Cass had noted the vulnerability of the United States, warning that "it is upon our maritime frontier that we are most exposed."[1]

By 1880 both England and Germany had developed fast-running, armored, steam-powered ships clad with from 6 to 24 inches of iron plate and carrying rifled guns of from 9 to 17 inches bore. These new armaments were capable of firing 800- to 2,000-pound shells at earthen and masonry fortifications along the coast. In resisting this tremendous power, the United States could muster only smooth-bore artillery and 110 modern rifled guns of 8-inch bore that fired shells weighing 180 pounds.[2] Obviously, such ineffective projectiles would bounce harmlessly from the sides of an iron-clad enemy vessel.

As early as 1869 a specially organized Board of Engineers recognized the nation's need to modernize its system of national defenses. The board reported that five areas needed modifying:

1. Cheaply constructed barbette batteries with earthen walls and gun platforms made of wood should be erected to protect the nation's harbors. These batteries would complement the old-style masonry casemated forts built prior to the Civil War.
2. Disappearing gun carriages should be used to mount the artillery. (This innovation was still being developed in 1869.) The new carriages would allow the guns to be lowered and loaded below the level of the fortification walls, thus providing maximum protection for the artillery corps. The guns then could be raised to their original positions for firing.
3. A system of large-caliber mortars should be established for defense against the ironclad steamships whose only vulnerability appeared to be in the deck areas. These guns would be capable of firing a shell with a high arc, which would drop almost vertically onto the deck of a warship.
4. Harbors and channels should be mined with torpedoes. During the Civil War, the Confederacy had perfected the use of underwater bombs or torpe-

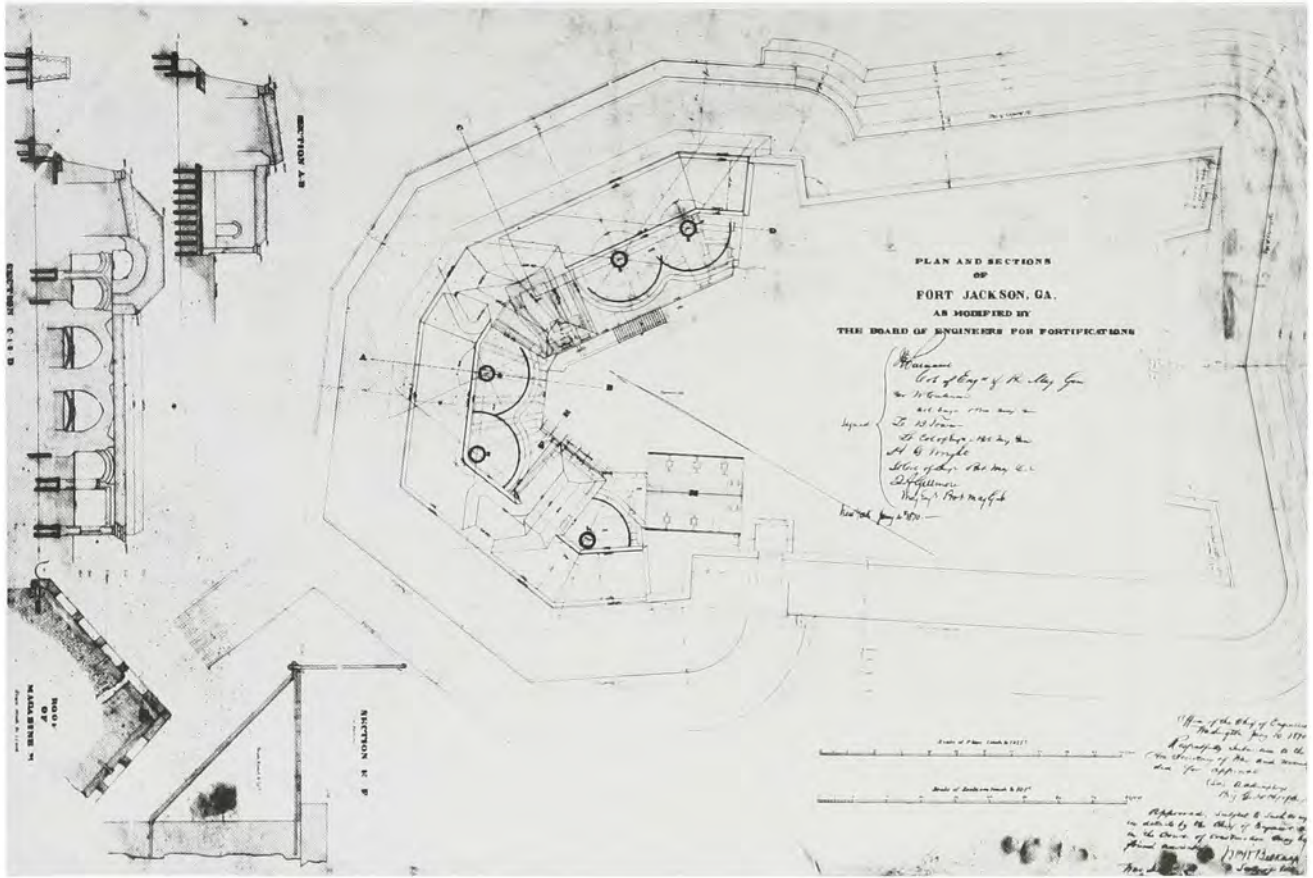
does. The value of such weapons was demonstrated by the fact that in 1862 the Confederates destroyed only one Union vessel with torpedoes but destroyed 11 in the last four months of the war.[3] In all, 24 Union vessels were destroyed and 9 others badly damaged by these weapons.[4]

5. Obstructions should be used to immobilize enemy warships and thus make them more vulnerable to artillery fire. Although permanent obstructions had been used early in the nation's military history, the 1869 report described obstructions as the "temporary closing by heavy floating masses."[5]

Torpedo technology, which was developed at the Engineer School of Application at Willets Point, New York, involved the use of explosive materials encased in an iron shell, with an electrically triggered detonator imbedded in the explosive. These mines were to be deployed across a channel by means of an underwater cable to which they would be attached at specified intervals. The electrical wires through which the detonators could be exploded would also be strung underwater through conduits that protected the wires from salt water. This system of torpedoes was to be operated from a central control apparatus that would be housed in a strong chamber deep within the battery fortification, "hidden from the enemy, and secured beyond all peradventure from his direct and curved fire."[6] The generators, batteries, central control mechanisms, lines, and torpedoes were to be serviced by officers selected from the Corps of Engineers and the artillery corps, assisted by soldiers from a torpedo corps of "intelligent and skilled engineer soldiers." Of particular concern was the need to be able to deactivate the torpedoes in the presence of American vessels and reactivate them against an enemy.[7]

The torpedo lines were designed to criss-cross and obstruct harbor mouths and channels in order to stop enemy vessels and hold them under the fire of battery fortifications constructed along the shore. These batteries housed the main torpedo apparatus and provided locations for the mounting of rifled guns and mortars for bombarding enemy ships. This integrated system of coastal defense also required renovating and modernizing the old-style masonry forts by adding iron or steel plating on the exterior walls of the casemated gun implacements. In 1880 the Chief of Engineers noted the task at hand: "It will require much time and large expenditures to make the necessary modifications of our casemated works, and to complete our barbette and mortar batteries and furnish them with suitable armaments. It would be but an act of prudence to make the beginning without delay."[8]

The improvements recommended in 1869 were extensive and costly. New batteries and artillery, improved gun carriages, and a system of torpedo defenses all were needed. National interests also stressed the need to develop a strong, modern navy composed of ironclad, steam-powered warships that would both protect a merchant fleet and provide an offensive strike force in case of war. These complex issues delayed implementing a comprehensive system of maritime defense. In 1885 the President appointed a board "to examine and report at what ports fortifications or other defenses were most urgently required and the kind of defenses best adapted to each with reference to armament."[9] This Board of Fortifications, the so-called Endicott board, and the permanent Board of Engineers outlined an efficient system of defense. By 1889 the Chief of Engineers stated that "it only [remained] for Congress to give life to the




*Plan drawn in 1870 by the Board of Engineers for fortifications for the proposed improvements and modifications on Fort Jackson. This project was not completed because improvements in armament technology necessitated changes in the pattern of seacoast defenses. (Savannah District, Corps of Engineers)*

project by making the necessary appropriations.'"[10] The main features were essentially the same as those proposed in 1869, with the addition of 27 specific locations where such improvements should be made. Savannah Harbor was listed as 19th in the order of priority.

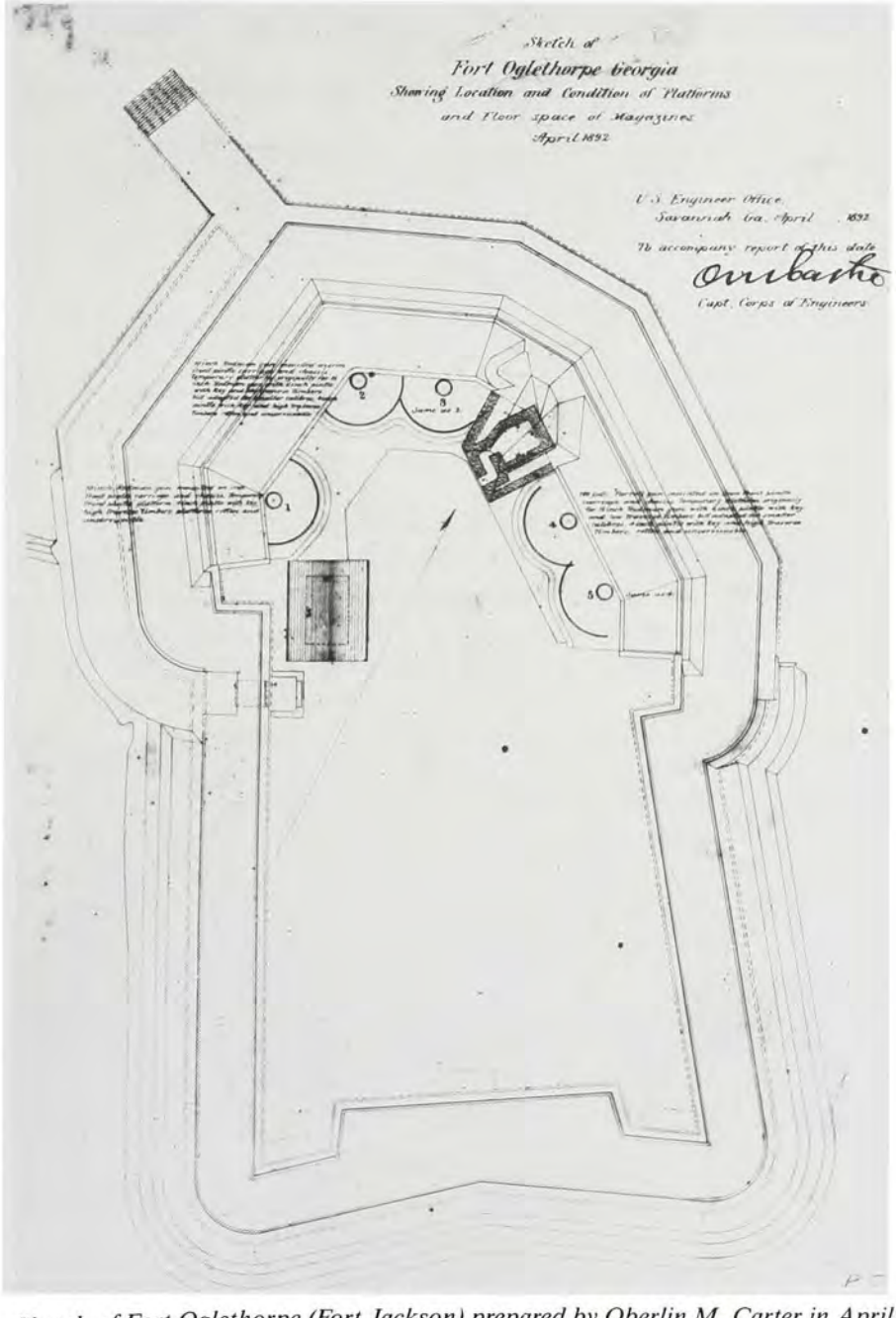
As of fiscal year-end 1890, no funds had been appropriated for new construction of seacoast defenses since 1875. The sporadic sums appropriated for the preservation and repair of fortifications were used for more urgent work such as restoring the wooden platforms used in the forts for heavy artillery. In 1890 the Chief of Engineers indicated that while some of the defensive works could be used in the new system of defense, "all have some importance as parts of a system, which though antiquated, forms the only means of land defenses, until supplanted by works of modern type. Hence they should not be allowed to go to ruin.'"[11] The political debates concerning armaments and fortifications were resolved by 1890, and congressional appropriations for modernizing the American defense system finally resumed. The Savannah District office received the first of the renewed allotments in 1894.[12]

Between 1869 and 1875 renovations and modernizing had been done at Fort Oglethorpe (known as Fort Jackson before 1867 and after 1905) and Fort Pulaski, both in Savannah, and at Fort Clinch near Fernandina. However, little had been accomplished when appropriations ceased, and work was reduced to essential maintenance. A few old-style smooth-bore guns remained at these forts, but these soon fell into disrepair and became unserviceable. In 1896 Captain Oberlin Carter complained that these three forts were ungarrisoned



*Fort Jackson (Fort Oglethorpe) on the Savannah River near Savannah in the late 19th century. (Savannah District, Corps of Engineers)*

and two were cared for by only ordnance sergeants. "All these works are in an exceedingly bad condition, overgrown with weeds, and with woodwork rotten and falling," he wrote, "owing to the limited appropriations available, extensive repairs have not been possible for some years."[13]




*Sketch of Fort Oglethorpe (Fort Jackson) prepared by Oberlin M. Carter in April 1892 which shows the location and explains the condition of the gun platforms as of that date. They were described as "rotten and unserviceable." (Savannah District, Corps of Engineers)*

In July 1892 the Board of Engineers proposed fortifications at the entrance to Savannah Harbor, focusing on the installation known as Fort Screven on the north end of Tybee Island at the mouth of the harbor. (Tybee Island had been acquired as early as 1873 for the purpose of locating battery fortifications there.) The board called for two batteries: one with two 12-inch guns and one with four 8-inch guns. Construction at Fort Screven moved slowly, and Captain Cassius E. Gillette did not report the Savannah District's completion of the battery for the 8-inch guns until May 1898.[14] Moreover, some earlier 19th-century structures were to be integrated into the coastal defense system of the 1890s. In 1896 the Chief of Engineers wrote that

> the older type works and armament are most valuable as adjuncts to the more modern works, and in many cases are now, or ought to be, altered in part, to receive a modern armament. They also form citadels capable of making strong resistance against infantry and boat attacks on the groups of works near them. In addition, in almost all cases their barracks, storehouses, and cisterns are needed for service of these batteries.[15]

Accordingly, the Savannah Engineers repaired and helped preserve Forts Pulaski, Oglethorpe, and Clinch, work which included such tasks as preventing dampness in magazines, maintaining drainage ditches, and repairing electrical equipment.

The crisis of the Splendid Little War with Spain in the summer of 1898 did more to dramatize the concern over coastal defenses than all the studies and committee recommendations of the previous decade, particularly in the south-eastern states that were so close to the war in Cuba. The United States was, in fact, at war with a European nation, but only the luxury of ultimate victory



*Fort Clinch in 1904. Left to right: barracks, prison and guard house, store building, northwest bastion, fireplaces of kitchen, and east bastion. (Fort Clinch State Park)*



*Interior view of Fort Clinch in 1904 showing the well in the forefront and the old store building. (Fort Clinch State Park)*

would reveal that the American mainland was never threatened seriously by the enemy. For the moment, residents of the coast feared for their safety. The responsibility for defending coastal Georgia from Savannah to Fernandina lay largely with the Savannah District under Captain Gillette's command.

Fortunately, the 8-inch battery on Tybee Island had just been completed as the United States declared war on Spain. Supported by guns on Wassaw Island and at Fort Pulaski, it helped protect Savannah Harbor. To supplement this protection, and as called for in the Endicott report, the Corps laid a mine barrage at the entrance to the harbor. The apparatus for operating the mine was housed at Fort Pulaski.

Other towns, however, were not included in the official plan. Yet, citizens of these port towns clamored for protection. With no defense funds available for Fernandina, Captain Gillette had to use what was already there, namely Fort Clinch and any existing armament. Using a $500 allotment from the 1897 Appropriations for Preservation Repairs of Fortifications Act, he coordinated an effort to rehabilitate three 15-inch guns and to make the old fort habitable for the artillery detachment manning the guns. The Engineers also began constructing a battery for one 8-inch rifle within the fort. Repairs included some reroofing, drilling of a well, and drainage projects.[16] The Engineers also planted mines in Cumberland Sound for the defense of Fernandina.[17]

Chief of Engineers John Wilson recommended the construction of temporary batteries for the defense of Brunswick and its harbor. Captain Gillette received consent to place two batteries on the south end of St. Simons Island, and negotiated with the Jekyll Island Club for permission to locate a battery on the south end of that millionaires' retreat. This battery, along with the one built on the north end of Little Cumberland, protected St. Andrews Sound.[18] Guns



*Cannon positioned in front of the Strachan Cottage on the south end of St. Simons Island overlooking the entrance to St. Simons Sound and Brunswick Harbor during the Spanish-American War in 1898. (Coastal Georgia Historical Society)*

also were set up on the south end of Sapelo Island to protect Doboy Sound and on the north end of Blackbeard Island to defend Sapelo Sound. These temporary and makeshift defense measures were abandoned after the war.

Following the 1898 crisis with Spain, the Savannah District office once more concentrated its attention on Fort Screven. According to Captain Gillette, work at the fort was not planned so much to protect Savannah or its harbor as it was designed to prevent an enemy from using Tybee Roads at the entrance to the harbor as a base for anchorage and operations.[19] While the Corps had played a direct role in defending the coast during the war with Spain, the Engineers' role evolved into providing construction and maintenance services to the Coast Artillery Corps garrisoned at Fort Screven after 1901. Between 1898 and 1904, the Corps of Engineers constructed six batteries at Fort Screven, which were transferred to the Coast Artillery Corps, Artillery District of Savannah, headquartered at Fort Screven. These included Batteries Brumby, Habersham, Garland, Fenwick, Backus, and Gant. The Engineers also established and operated electric power installations there, which included setting up searchlights for night defense at the mouth of the Savannah River. This required that the Corps obtain and assemble all the necessary apparatus and machinery for the lights, such as generators, switchboards, engines, storage batteries, etc., and then build the towers and support buildings. The Savannah District transferred a 24-inch searchlight to the Coast Artillery Corps in 1901, a 36-inch searchlight in 1908, and a 60-inch searchlight in 1915. Maintaining the searchlight facilities became a continuous responsibility for the Corps in that the moist sea air posed a constant threat to mechanical and electrical appliances at the fort.

The Savannah District also was in charge of constructing and keeping up the

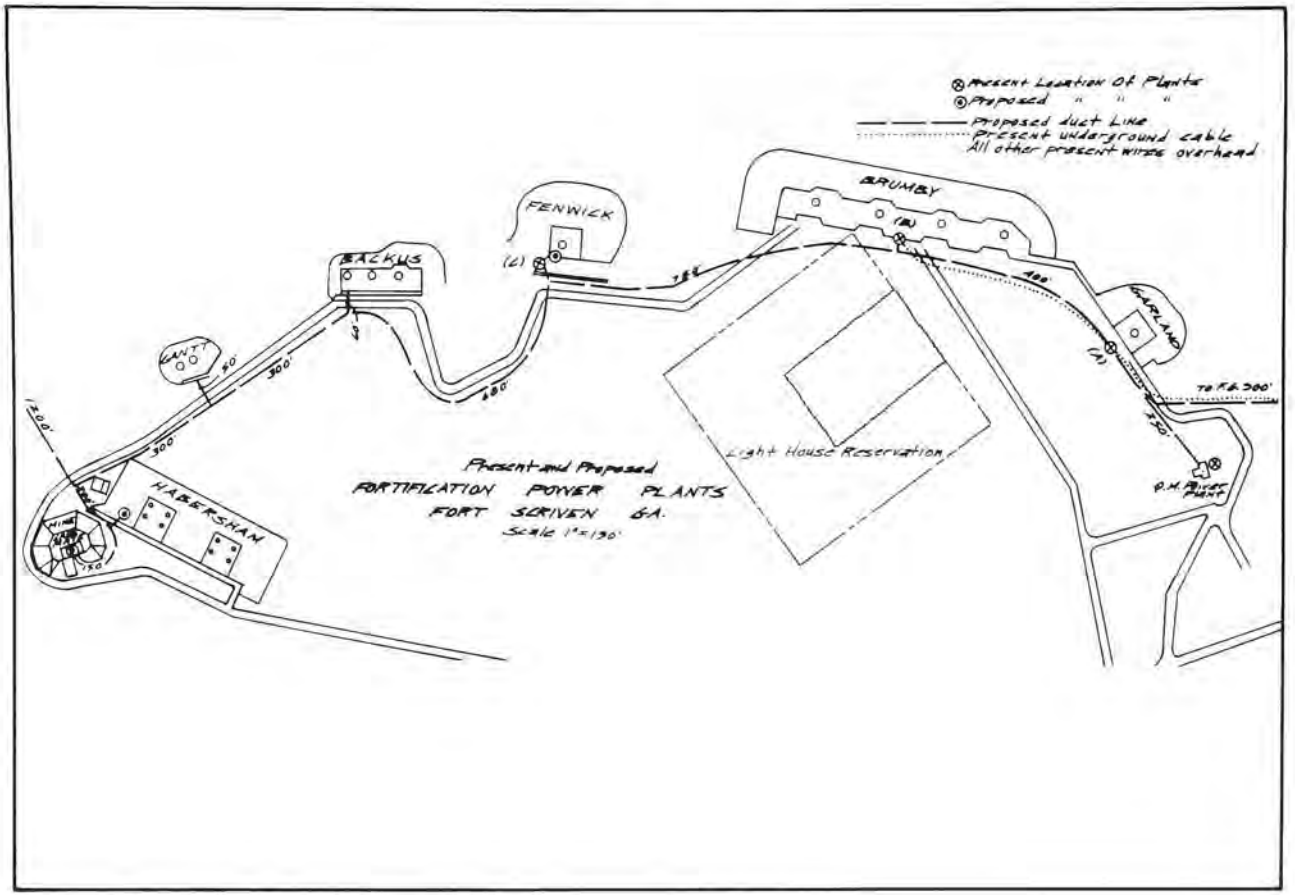



*Diagram of battery locations at Fort Screven on Tybee Island. (Adapted from drawing in National Archives, RG 77, Entry 103, file 38962/60)*

new submarine mine defense system in the waters off Tybee Island. Under revisions in the Army Reorganization Act of 1901, the operation of the system was transferred from the Corps of Engineers to the Coast Artillery Corps, which acquired torpedo materials such as cables, cases, and floating devices. However, the Engineers continued to construct and maintain the necessary buildings, casemates, cable tanks, etc., necessary to mine defense.[20] In this capacity the Savannah District Office worked closely with both the Coast Artillery Corps and Army Ordnance.

The Corps resented what it considered a reduced role in coastal defense in Georgia and elsewhere and its lack of control over the situation. In 1905 the Chief of Engineers stated,

> In accordance with the view of the artillery authorities, [the new torpedo-defense structures] are in great measure built of timber and corrugated iron, which permits the electrical instruments to be kept in dry well-lighted rooms, but which makes the structures themselves liable to more rapid deterioration and decay than the more costly structures of concrete and masonry adopted by the Engineer Department when it had charge of torpedo operations.[21]

The Engineers were responsible for upkeep on the new structures, which they considered inadequate to withstand the local climate and geography.

In 1906 the chief of Coast Artillery recommended that a torpedo wharf be built at Fort Screven. The job was delegated to the Savannah Corps of Engineers, although the Quatermaster Corps, also responsible for Army construction, was to pay two-thirds of the cost. Colonel Kingman declared that a deep-water wharf would have to be very long and therefore expensive because of



*View of Fort Screven taken from Tybee Lighthouse in 1907. Note Battery Garland at the left of the photograph. (Georgia Historical Society)*

the shallow water off Tybee Island. He proposed that a medium-length wharf be built, that a channel 100 feet wide and 12 feet deep be dredged to it, and that a turning basin be built next to the dock. The dredging was done and the newly built wharf and boathouse were transferred to the Coast Artillery in December 1909. However, the Corps had continuous problems with this project because of shifting sands caused by tidal forces in the area. By early 1910 additional dredging already was needed, as it was again in 1913, 1914, and 1917.

The Corps of Engineers' responsibility for preserving and repairing fortifications and torpedo structures at Fort Screven covered a wide range of activities in the years prior to World War I, many of them mundane. For example, Colonel James Quinn reported to the Chief of Engineers in 1904 that the Savannah Engineers had completed a latrine to the rear of Battery Brumby and was prepared to turn it over to the Coast Artillery.[22] The Corps likewise removed the old Martello tower that had been constructed during the War of 1812 on the site of Fort Screven but that interfered with the present operation of the batteries.



*The old Martello Tower at Fort Screven on Tybee Island c. 1900 before it was torn down by the Corps of Engineers. The building on top was used as the Tybee Telephone Exchange. (Georgia Historical Society)*

Much of the Corps activity at Fort Screven was devoted to coping with the oceanside environment. Virtually everything had to be painted constantly, and the Corps had difficulty finding a paint that was suitable for galvanized iron and that would last through a hot, humid summer.

Another challenge was battling the blowing sand that threatened the batteries and their guns. In the fall of 1899 Captain Gillette reported that in some places sand had built up several feet above its normal level. The Corps experimented by sowing such plants as lupine, sand vetch, and common oats as well as transplanting sea oats, Spanish bayonets, and Bermuda grass sod on the parapets. Only the Bermuda grass and Spanish bayonets grew. According to the District Officer, the sand was too "clean" and offered no nutrients for the plants, and thus "the only apparent remedy appears to be to cover the entire sand-blowing area with stable manure."[23] In 1900 and 1901, 30 cars of manure and 13 cars of brush were spread over the sands at Fort Screven, to which was added sprigs of Bermuda grass. Gillette soon reported that blowing sand had ceased to be a problem.[24]

As the Savannah Engineers focused increased attention on the more modern facilities at Fort Screven, the venerable Fort Pulaski was virtually abandoned. Because the Chief of Engineers was responsible for the care and preservation of historic fortifications, Fort Pulaski fell under the charge of the Savannah District. However, during the early 20th century, the District Office did little more in relation to the fort than periodically selecting a caretaker. The obligations of the caretaker included general upkeep and maintenance in return for a house and the privilege of farming on the grounds. Often this former pillar of Savannah's coastal defense suffered the indignities of having a potato patch on its parade grounds and cattle and hogs housed within its casemates.[25]

Soon after the war with Spain, Fort Pulaski was removed from any defense plans. The submarine mine property was removed to Fort Screven, and the fort was left to the forces of nature and vandals. By World War I, one inspection of the fort prompted the statement, "The general conditions of the whole place are summed up as dilapidated."[26] Colonel Kingman lamented the lack of funds for repair and preservation during his tenure as Savannah District Office. He stated that it was "inconceivable that it would ever be used again for military purposes," but later called it "a fine specimen of a brick fort." Referring to the whole generation of 19th-century forts meeting much the same fate as Fort Pulaski, Colonel Kingman suggested that "Congress would do well to make provision for the moderate care and preservation of all of these old structures, even though they do not at present form a part of the plan of defense."[27] Funding finally came for some general cleanup, but the results were only temporary. Colonel John Millis suggested that "it would also be very desirable to have a small fund available for regular maintenance."[28]

Throughout recent decades the Savannah District had been responsible for defense and various aspects of military construction, as well as for care and preservation of historic fortifications along the Georgia coast as far south as Cumberland Sound and Fernandina. In April 1916 that area of military responsibility was enlarged as Fort Fremont at Port Royal, South Carolina, having been taken out of commission in 1912, was turned over to the Savannah District by the Coast Artillery. This "unmanned fortification" was to be preserved by



*View of tent encampment at Fort Screven c. 1917 with Battery Garland in the left background. (Georgia Historical Society)*

the Corps of Engineers. With the U.S. entry into World War I, a small detachment of Coast Artillery troops from Fort Screven reoccupied Fort Fremont, which included a 10-inch gun battery constructed in 1898 and 1899.

Declaration of war against Germany in April 1917 brought renewed attention to coastal defense. The Corps once more provided construction support to the Coast Defenses of Savannah, formerly known as the Coast Artillery District of Savannah and likewise headquartered at Fort Screven. The Corps provided searchlights and built coincidence range-finder stations at Batteries Backus and Gant on Fort Screven. The District Engineer, Colonel Millis, sat on the special board of officers created to review fire-control installations in the District and to plan for additional ones. The fort never became a defense bulwark, however, as part of its armament was either shipped overseas or placed on ships during the war.

Most of the Savannah Engineers' defense construction work related to the war was not completed until after the conflict. For example, the Corps did not transfer the new searchlights and their accessories at Fort Screven to the Coast Defenses of Savannah until 1921 and did not complete the four new 20-foot steel fire-control towers there until 1922.[29]

Submarine mine defense of the entrance to the Savannah River, in which the Corps had played a major role, was discontinued in 1920. In addition, all buildings associated with the Corps of Engineers Mine Defense were transferred to the Quartermaster Corps.[30] Defense concerns, however, were not removed entirely from the Savannah District's sphere of activity. Even as President Woodrow Wilson was signing the Treaty of Versailles in June 1919, Colonel Frederick W. Altstaetter was ordered to report on a revised project for defense

from Port Royal, South Carolina, to Cumberland Sound. His study included geographical features such as land characteristics, rivers, and the sounds between the islands and mainland; the major port towns and transportation facilities were discussed also. He evaluated these in terms of their impact on effective protection of the District from enemy attack and then reported on the present defenses in the area, which were at that time limited to the entrance to Savannah Harbor.

Colonel Altstaetter played down the importance of defenses in the Savannah District, saying that the only permanent seacoast defenses should be at Savannah Harbor and even these were of questionable value. "Probably one reason Savannah is defended at present," he wrote, "is because when our fortification system was first built Savannah both politically and in a military sense had more importance as compared to the rest of the country than it has today." However, he maintained that because fortifications did exist at Fort Screven, some modernization should be carried out there. He outlined such improvements and even prescribed armament and strategies for defense.[31]

Despite Colonel Altstaetter's attention to Fort Screven and the completion of additional construction in the early 1920s, the Corps' military responsibility in the Savannah District ended temporarily as the Army reduced its coastal defense effort. The agreements at the 1921-1922 Washington Naval Disarmament Conference portended an era of world peace, and the Republican administrations of President Warren G. Harding and Calvin Coolidge sought ways to reduce government expenditures, particularly for defense. The Coast Defenses of Savannah under the Coast Artillery Corps was disbanded. Furthermore,



*Infantry troops in Company A stationed at Fort Screven practice use of machine guns on 30 June 1932. Note the deteriorating condition of the battery in the background. (Georgia Historical Society)*

Fort Screven was handed over as headquarters for infantry troops in 1924, and the Quartermaster Corps became responsible for its upkeep and repair. Most of the Corps equipment at Fort Screven either was sent to other military installations or transferred to the District's river and harbor activities. Only five buildings there were still under Corps supervision as of 1930, and they were suffering from neglect. The District Engineer, Major Douglas L. Weart, explained that no military funds had been allotted to the Savannah District in the previous few years and none were expected. Thus, he petitioned the Chief of Engineers to have these structures transferred to the Quartermaster Corps and thereby to terminate all Corps obligations at Fort Screven.[32] This was accomplished by order of the Secretary of War in August 1930.

During the 1920s the Corps' jurisdiction over Fort Pulaski also ended. As of 15 October 1921 the structure and the land around it were placed on the Army's list of real estate to be disposed of. However, the War Department later chose to designate the reservation as a national monument.[33] On 15 October 1924 Calvin Coolidge, exercising his power to establish historic sites situated on U.S. government property as national monuments, designated Fort Pulaski as such.[34] The Assistant Secretary of War subsequently transferred the fort to the Quartermaster Corps to be administered in the same way as that group supervised National Military Parks. On 30 June 1925 Fort Pulaski ceased to be a responsibility of the Savannah District.[35]

Colonel Millis, District Engineer from 1916 to 1918, received much of the credit for the fort's status as a national monument. He also was credited with "unearthing" the original plans for the fort and praised for instigating its first major cleanup in decades.[36]

The first decades of the 20th century saw a gradual but steady decline in the Savannah District's military mission; only the coming of another war would reverse that trend. However, the Engineers faced one last responsibility in their military role before World War II — to attack beach erosion at Fort Screven. Actually, this problem had persisted on Tybee Island; the action of tides and waves had long threatened the defense works built by the Engineers. As early as 1882 three spur dams had been built with logs and riprap. In 1907 the Quartermaster Corps built a seawall there, but this structure soon was undermined by the water. A series of short stone jetties then was built, but they were ineffective. Over the next several years various District Engineers proposed ways to deal with the problem. In 1908 Dan Kingman suggested constructing a series of jetties out into the water at right angles to the shore, and in 1909 he proposed building a breakwater to create an outer reef offshore. The War Department, however, never requested the funds to implement these ideas.[37]

By 1917 the erosion was worse, and Colonel Millis proposed constructing additional jetties. Two years later the Corps again was called on to build a breakwater with a connecting dike offshore, an idea reminiscent of Kingman's 1909 proposal. Another suggestion was to construct 17 spur dikes. However, congressional funding was not forthcoming.[38]

In 1924 autumn storms exacerbated the erosion. Fort Screven and the rest of Tybee Island were threatened once more by the encroaching sea. Because the Quartermaster Corps was now responsible for Fort Screven, the Corps of Engineers, and specifically the Savannah District, was relieved of dealing with

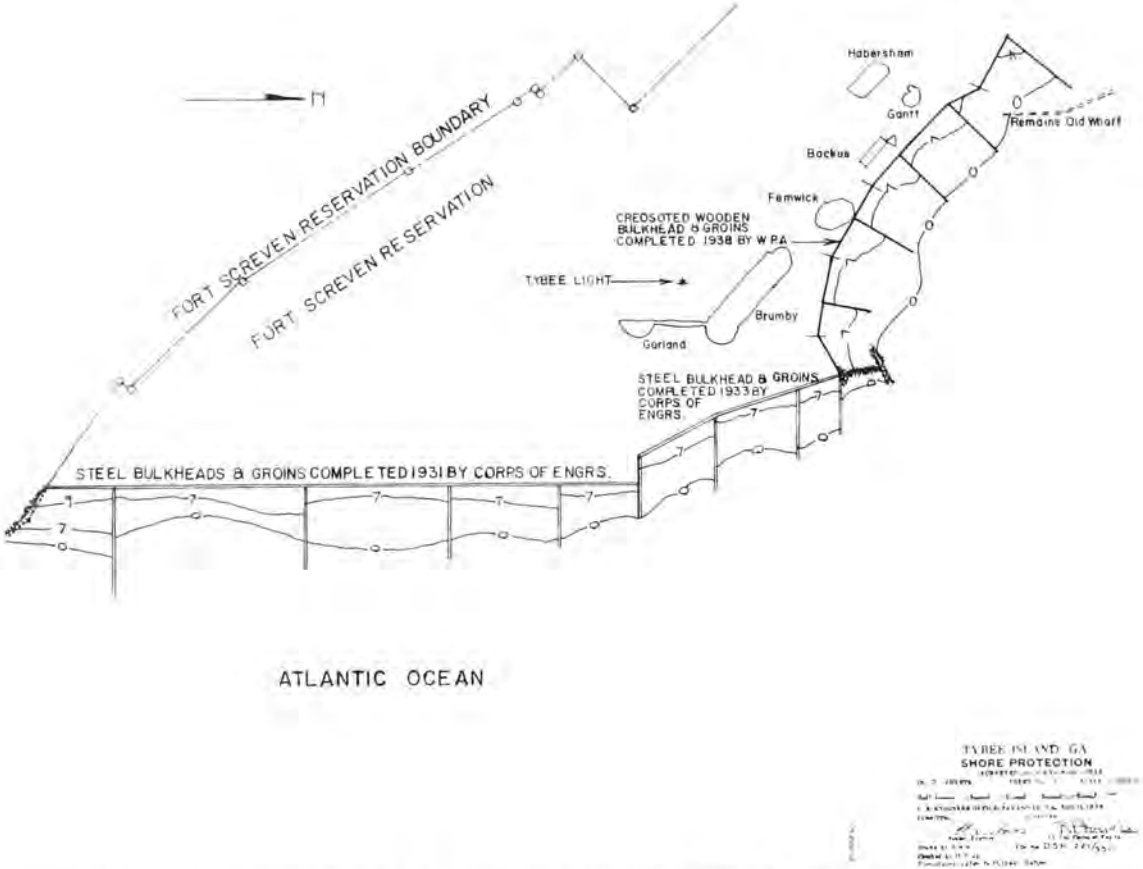



*Diagram showing location of bulkheads and groins built in the 1930s at Fort Screven as an effort to protect the beach from erosion. Note also the locations of the batteries and the remains of the old wharf built by the Corps of Engineers in 1909. (Savannah District, Corps of Engineers)*

the problem. In the words of one officer, "This office has indicated and intends to take the position that the matter cannot again be brought up by the District, since navigation is not effected [*sic*] and the fortifications at Fort Screven have been closed down...."[39] District Engineer Major Dan I. Sultan reported that "the personnel of this office formerly engaged on fortifications works have been transferred to other work" and added that the "press of work in connection with river and harbor activities" now commanded the District's full attention.[40]

Local citizens and officials in Savannah and on Tybee Island continued to press for federal intervention. Congress finally responded with the 1927 Rivers and Harbors Act calling on the Corps to make a preliminary examination to determine the causes of the erosion and its effects on the channels leading to the harbor and to propose a solution. District Engineer William F. Tompkins echoed those District Engineers who had preceded him when he cited natural causes and discounted any claim that harbor improvements had aggravated the problem. Moreover, he failed to recommend a plan for controlling beach erosion. Tompkins stated that the U.S. government had never assumed responsibility for beach erosion control and, therefore, should take no action at Tybee Island.[41] His conclusions were upheld by the Division Engineer and the Board of Engineers for Rivers and Harbors. The islanders were left to deal with the problem. The town subsequently built four groins with help from the Central of Georgia Railroad, which had tracks out to the island.

Whatever the causes of the situation, the shoreline at Fort Screven and the rest of Tybee Island continued to erode. The commander of the infantry troops there was sure that it was only a matter of time before most of the reservation would fall into the sea.[42] In light of these threats to a military installation, the Corps of Engineers became involved once more. If the Savannah District turned a deaf ear to civilian concerns about the fate of the whole island's shore, military needs now warranted the Corps' attention to beach erosion, at least at Fort Screven. District Engineer Weart urged that the Corps take protective measures immediately because the erosion was progressing rapidly.[43]

The Savannah Engineers surveyed the beach from the south boundary of the post northward for 2,600 feet. Erosion was most serious in this section, which adjoined the parade ground and drill field. The Engineers drew up plans for a 2,650-foot-long bulkhead and five groins joined to and extending seaward out from the bulkhead as far as the old seawall, which was now outside the low-water line. The bulkhead and each groin consisted of a single row of interlocking steel sheet piles bolted to a frame of creosoted wood. The work, contracted to the MacDougald Company of Atlanta, was completed by January 1931.[44] As this was not a rivers and harbors project and the fort was an infantry installation, funds for the project came from military appropriations earmarked for Quartermaster Corps maintenance.[45] The entire project was supervised by the Corps of Engineers, however.

Although the bulkhead and groins were effective, they simply did not go far enough up the beach. Erosion continued to threaten the fort north of the structure. According to one survey, the encroachment in the last six months of 1931 averaged approximately one foot per day. The advancing water threatened all the batteries and even the lighthouse located farther inland. At that time, Batteries Garland and Fenwick each were armed with a 12-inch gun on a



*General view of the first bulkhead and groins built in the 1930s to protect Fort Screven from beach erosion. The MacDougald Company under contract with the Corps of Engineers completed the construction in January 1931. The derrick-rig shown is working on groin No. 3. (Savannah District, Corps of Engineers)*



*Groin No. 1 built by the MacDougald Company to help protect Fort Screven from beach erosion, looking east toward the ocean as of 12 February 1931. Notice the construction of interlocking steel sheet piles bolted to a frame of creosoted wood. The remains of the old Quartermaster Corps seawall can be seen in the distance. (Savannah District, Corps of Engineers)*

barbette carriage, and four 12-inch mortars were mounted at Battery Habersham. The target butts on the rifle range and part of the range itself were also endangered. The commander of the 8th Infantry, based at the fort, appealed for help.[46] The problem intensified over the next year as "areas absolutely essential to the post" were washing away, and the Savannah District Engineer once more was called on to develop plans for additional beach protection. Major Creswell Garlington presented plans for extending the present bulkhead 1,350 feet northward and for constructing four additional groins extending seaward out to the old seawall, as well as for repair work to the existing bulkhead and groins damaged in recent storms.[47] This time the Corps carried out the project using hired labor and government plant. Quartermaster funds again financed the project, which lasted from 15 May to 30 November 1933.[48]

Even this effort failed to end the erosion on Fort Screven, so the Savannah District Engineer was called on once more to help develop plans for another extension northward. This new project specified a wooden bulkhead and five wooden groins to be built under Corps of Engineers supervision. The decision to change from a steel bulkhead to a timber one was based on cost factors, for this project was to be funded by New Deal relief funds provided through the Works Progress Administration (WPA), and estimates for steel sheet piling exceeded the amount authorized by WPA administrators.[49] WPA relief labor completed the project in 1937.



*Wooden bulkhead and groins built by the W. P. A. under Corps of Engineers supervision to further protect Fort Screven from beach erosion. The photo was taken from the target butts at the Fort on the north end of Tybee Island on 22 June 1937. (Savannah District, Corps of Engineers)*

# 10 THE RECENT PERIOD, 1940-1984

During the 1920s and even moreso in the 1930s, the nation experienced a mood of isolationism just as the world was moving closer to an international conflict. On 1 September 1939 Nazi Germany invaded Poland, after having seized Austria and Czechoslovakia. When Great Britain and France declared war on Germany two days later, World War II was under way. President Franklin D. Roosevelt proclaimed a policy of neutrality for the United States, which was soon complicated by the events of 1940 and 1941 in Europe and Asia. With the Japanese attack on Pearl Harbor on 7 December 1941, America was drawn into the conflict.

Germany's aggression against Scandinavia, the Benelux countries, and France in 1940 "finally awoke the American people from their complacent attitude toward the war," according to Foster Rhea Dulles, one of the preeminent historians of the era. Dulles added, "The shattering impact of German conquests in western Europe overnight aroused them to the demands of national defense and to the urgency of aiding nations which alone stood between them and a possible future attack on American shores."[1] President Roosevelt made his position clear on 10 June 1940 when he told the graduating class of the University of Virginia that the United States would materially support the opponents of Germany and begin a military preparedness program "in order that we ourselves in the Americas may have equipment and training equal to the task of any emergency and every defense."[2]

Responding to the President's commitment, the nation in 1940 began to prepare for war should it come. America's first peacetime conscription law was passed and implemented in September 1940. The preparedness efforts and the nation's subsequent involvement in World War II restored the Corps of Engineers' historic role in national defense. Just prior to the attack on Pearl Harbor, Congress placed all military construction for the Army under the Corps of Engineers.

With full-scale mobilization, for the next three to four years the nation focused on victory in Europe and the Pacific. Normal peacetime pursuits were neglected if not totally ignored. The Corps applied its civil works construction experience to meeting the demands of war. Some ten million men served in the Army during the conflict, and training them required new camps and airfields and the expansion of existing ones.

When peace finally came in 1945, Americans sought a return to normalcy. The policy of the United States always had been to reduce military activity to a minimum following a conflict. However, the nation may have been too eager to deactivate and dispose of military installations in the late forties. With the developing Cold War, Communism became the new threat to the free world, and the United States had no choice but to accept the world leadership role the country had tried to avoid since the end of World War I.

By 1950 another war broke out when the Communist North Korean forces invaded South Korea. Although Congress did not actually declare war, the police action carried out under the United Nations banner required U.S. military mobilization and training. The Corps of Engineers again carried the burden of providing the Army posts and Air Force bases.

The Korean War was only a three-year interlude in the continuing Cold War of the 1950s. After this war, however, the nation would not demobilize so thoroughly. Cold War diplomacy required a strong national defense and even offensive capability. Thus the Corps' military responsibility would continue, although on a reduced scale. The 1950s, more than any other period in the nation's history, seemed to demand the continued presence of a large standing military force. This military posture required installations with permanent buildings to replace those temporary structures hastily built during World War II and rehabilitated for the Korean conflict. The changing technology of contemporary warfare also imposed the need for new construction. Some sections of the country, including Georgia, were better suited to having permanent installations. From this time on, although the Savannah District would include fewer military installations, they would be larger.

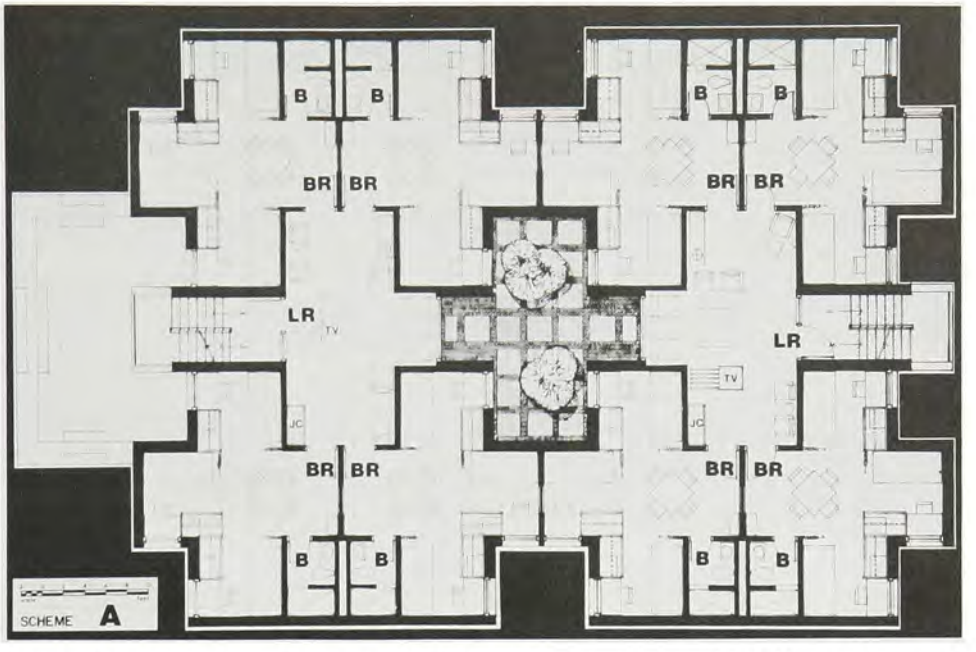
The years leading up to the Vietnam War saw a slow but steady rise in the annual military construction budgets. Having adapted to the responsibilities of the Cold War, the Corps was better prepared to carry out new military projects. However, a national mood of opposition to the Vietnam involvement began to develop. This negative attitude was directed toward the military as a whole.

The Vietnam situation likewise brought the United States' role in world affairs under close scrutiny once more. For a time a spirit of isolationism, reminiscent of that in the 1920s and 1930s, seemed to be on the rise. While some called for a retreat from foreign commitments, others insisted that the nation must maintain an active role in international affairs. At the same time, rampant inflation called into question the large military appropriations. However, global conflicts, both real and potential, dictated a continued growth in military strength. Even though construction of Army and Air Force facilities declined in the early 1970s from that of the Vietnam escalation, peacetime construction reached unprecedented levels, especially in the Southeast.

At this same time Congress abolished the draft and provided for an all-volunteer Army. National defense now relied on the Defense Department's ability to attract enlistees. The Corps of Engineers was called on to create a "new look" on Army posts and Air Force bases to match the modern image of the soldier and airman. Concerning the new concepts and designs for living quarters and service buildings, one observer noted, "Emphasis was placed on supplying and furnishing modern, convenient housing for professionals rather than simply providing minimal shelter for troops."[1] Permanent construction

was planned to replace the temporary structures originally built in World War II with an anticipated life of 3 to 5 years but still in service 30 years later.

The two administrations of President Ronald Reagan from 1981 to 1989




*Floor plan of modern dormitory facilities. This is an example of the trend toward comfort and permanence in military construction. (Lyles, Bissett, Carlisle, & Wolff, Architects)*



*Barracks at Pope Air Force Base, Savannah District. (Savannah District, Corps of Engineers)*



*Modern military facilities, Fort Jackson, Savannah District. Compare the new construction with that of the World War II era. (Savannah District, Corps of Engineers)*

placed enormous emphasis on national defense, and Congress responded generously. At the same time, the military recovered from the taints of the Vietnam era. Writing in 1984, Lt. Gen. J. K. Bratton, Chief of Army Corps of Engineers, declared, "The mid-1980s have arrived and the nation and its armed forces are setting the national security course and objectives that will carry us well into the 21st century." He then added, "It is a time of almost unprecedented peacetime opportunity for the military services to forge stronger, modernized forces on land, sea, and air." That modernization included construction of new training facilities, housing, dining and medical facilities, maintenance shops, and other physical plant and/or remodeling existing facilities. It also provided for community support centers that offered expanded entertainment, religious, and cultural facilities and such new amenities as physical fitness and child care centers on bases and posts. Bratton concluded, "We are in a time of great prosperity for our military installations and for the engineers responsible for them—almost a renaissance after some lean years in the 1970s."[4]

The military building boom of the 1980s was not permanent, however. By 1988 Congressional budget restraints forced reductions in military spending throughout the Department of Defense. The Corps of Engineers, as the designing and construction arm of the Army and Air Force, particularly felt the effects of these cutbacks; virtually every engineer district anticipated severely reduced military workloads in the 1990s. The political changes in the Soviet Union and eastern Europe by late 1989 and 1990 and the apparent new era for world peace further endorsed these reductions.

Because of the Corps' activities as construction agent for the Army during

World War II, many civil projects had to await the return of peace. The nation simply could not afford the expenditures of time, money, and critical supplies required for civil works. With the Japanese surrender and the beginning of military demobilization, the Corps resumed its historic role as the developer of the nation's rivers and harbors.

Except for short periods of economic recession or inflation, the nation's economy improved steadily over the years following the war. Americans enjoyed an unprecedented level of affluence, which spurred the expansion of trade and commerce. Rivers and the great inland waterway systems that had been developed over the previous decades assumed even greater significance, with traffic quadrupling between 1946 and 1957.[5] However, the trend of the 1920s and 1930s continued; certain river systems dominated the growing river trade while others paled in importance. Rivers that were parts of great water networks serving industrial sections stimulated further industrial development, which in turn created new traffic. Other rivers were neither part of such great waterway systems nor did they answer the need for cheap transportation of commodities. Also, some of the lesser systems could not accommodate the new, modern towboats and barges dominating river commerce. As railroads and trucking companies provided alternative methods of transportation, many once-important river passages were bypassed.

Progress was stripping many rivers of their original navigational value. Recognizing this, the Corps of Engineers in the early 1950s began to divide its navigation projects into three groups: active, inactive, and deferred for restudy. Later in the decade the Corps investigated the anticipated needs of the nation's waterway systems and recommended that "commercially important waterways" be deepened and, in some cases, widened. The report also proposed that "waterways no longer constituting economic components of the Nation's transportation system" should be removed from the Government's program of waterways development.[6] Two decades passed before projects were actually deauthorized. Some Corps Districts, including Savannah, lost virtually all river navigation improvement projects as a result of this reassessment of priorities, while others saw their jobs greatly expanded.

Harbor development faced similar circumstances after the war. The move away from improvement projects in small harbors had begun before 1940, and it accelerated in the years following. The larger ships being built required deeper and wider harbors. The increased number of ships using some harbors called for larger total areas.

While the changing times affected the nature of the Corps' work on navigation improvements, they also broadened the Corps' civil works mission. For decades each Corps operation had been measured in terms of its economic effect on navigation, then flood control and hydroelectric power generation became important considerations. Later, social and environmental as well as economic factors affected Corps activities, and by the 1960s these new roles were competing with traditional navigation projects.

In terms of national planning, river basin development reached its fullest expression in the Tennessee Valley Authority (TVA) Program of the New Deal era. This program of comprehensive river basin development created jobs and



*West Point Dam under construction on the Chattahoochee River, built by the Savannah District, an example of one of the major dam and reservoir projects of the Corps of Engineers since World War II. (Savannah District, Corps of Engineers)*



*The power generating plant at the Richard B. Russell Dam on the upper Savannah River, Georgia. (Savannah District, Corps of Engineers)*

generated hydroelectric power for industry. While World War II made this emphasis secondary to the military effort, planning for river basin development did not stop. The period beginning with the Flood Control Act of 1944[7] and extending up to the National Environmental Policy Act of 1969[8] included comprehensive river basin projects related to flood control, navigation, hydroelectric power production, and recreation. As the national agent for engineering and planning related to the use of water resources, the Corps of Engineers was central to this expanded program.

Prior to enactment of the first general flood control legislation in 1936, Congress stated clearly that the federal government should participate in only those projects designed to protect urban areas against great or catastrophic floods. Authorized projects were to be chosen on this basis. When the bill finally was passed, however, many projects were included that were designed to protect agricultural areas. Congress then began to take a broader view of flood control, and in successive flood control acts authorized protection of urban areas not subject to catastrophic flooding as well as agricultural areas of all sizes.

In 1936 Congress still planned for single-purpose flood control projects, but it soon became evident that reservoirs built to store floodwaters could be used for other purposes, particularly to generate electric power. In considering the terms of the 1944 act, Congress had begun to understand the importance of comprehensive and coordinated development of the nation's major river basins. By 1950 Congress was directing the preparation of comprehensive plans for the full development of many of the major river systems in the nation.

In the 1960s these acts, although still being referred to as "Flood Control Acts," constituted the main body of federal law related to developing, using, and conserving the nation's water resources. Under these acts, power was generated and marketed, irrigation water was made available in arid regions, water was provided for municipal and industrial uses, navigational improvements were instituted, recreational facilities were provided, measures were taken to enhance the fish and wildlife population, and regional planning was begun. In short, Flood Control Law provided for the broadest programs of public works and resource development ever undertaken by the federal government.

After 1965 public interest in comprehensive river basin development as a part of national water policy planning began to diminish. While large expenditures for river construction works continued, the projects were scrutinized and often criticized by the public. One factor in the decline of public support was the environmental movement of the 1960s, which challenged the original premise of comprehensive development and stressed new and different values. The unquestioned merit in developing natural resources was rejected. The public became more aware of the ultimate effect of such development on the environment. Ecologists challenged the validity of resource development in general and raised questions about many specific development proposals.

At the same time, widespread skepticism was emerging toward Government in general and bureaucratic policy decisions in particular. Interest groups and individuals, both in and out of Congress, persistently challenged resource development proposals. Because the original justification for river basin development (the need for jobs and cheap hydroelectric power) was no longer viable,

these interests gained support. At the same time, new urban issues (eliminating poverty and racial discrimination and providing jobs for the urban poor) captured public attention. Preoccupation with the Vietnam War also deflected support for river basin development in the 1960s.

During the 1970s such needs as developing synthetic fuels and new military defense technologies became politically more pressing even if not economically more justifiable. In addition, most of the major and more necessary water projects were either under way or had been completed. By 1980 comprehensive, multipurpose river basin development as an economic priority had few supporters. The era of the great dams had come to a close.

During the 1980s budget constraints due to concerns over the national debt delayed or prevented much new construction on civil works by the Corps of Engineers. The emphasis on military spending at this time also impacted civil projects. Congress refused to authorize some projects and denied funding for others.[9] Appropriations for new studies and designs often went lacking.

One of the most serious problems faced by proponents of Corps of Engineers civil projects in the mid-1980s was the demand by the Reagan presidency that local interests pay a major share of the construction costs. Local governments historically had always played an economic role in navigation projects such as purchasing easements, providing and maintaining dredge disposal areas, and assuming responsibility for damage claims. However, the administration now asserted that local governments should fund a significant portion of the actual improvement project as well. At one point that amount was set at 70 percent.

In the Water Resources Development Act of 1986, Congress finally established the local funding obligation for harbor construction to be 10 percent on projects with a depth of less than 10 feet, 25 percent on projects with a depth of 21 to 45 feet, and 50 percent on projects with a depth in excess of 45 feet. These provisions applied only to projects not yet contracted at the time the law was passed. A 25 percent local contribution was assigned to dams and flood control projects.[10] Reportedly, the rationale behind such legislation was that "if locals have to shoulder some of the burden, marginal and unnecessary construction won't occur."[11] This landmark legislation created "perhaps the greatest cultural change throughout the Corps of Engineers since 1824 when the Corps first got into the civil works business." The traditional pattern of Congress authorizing federally funded studies and projects based upon the concerns and demands of local constituencies (which often led to charges of pork-barrel legislation) was permanently transformed by the 1986 Act. Local governments have become partners in such studies and construction projects rather that "customers."[12]

All the delays and other problems in river and harbor work and dam construction did not mean that the Corps' role in civil projects had ceased to be an important mission. On the contrary, Chief of Engineers Bratton asserted in 1984 that, as in the earliest days of the Corps of Engineers, "the basis for the Corps' mobilization preparedness and for the maintenance of its engineering and construction expertise is its in-being peacetime construction force, two-thirds of which is based on our civil works mission."[13] The reductions in military projects by the end of the decade elevated civil projects to renewed importance.

Meanwhile, in recent decades the Corps' other responsibilities broadened. The Federal Government first became involved in the attempt to control pollu-

tion in 1969. Prior to 1960, Congress had passed few acts directly related to pollution control; the 1955 Federal Water Pollution Control Act being one example. During the 1960s, Congress enacted a Clean Air Act (1963) and Amendments (1965), a Solid Waste Disposal Act (1965), a Water Quality Act (1965), and an Air Quality Act (1967). These acts set standards and dictated cooperation among the federal, state, and local governments in meeting these standards. In 1969, however, the National Environmental Policy Act provided broad legislation. This act established the Council for Environmental Quality, which was to coordinate all federal pollution control programs and recommend to the President additional policies to improve the quality of the environment. The act also created the Environmental Protection Agency to implement federal policies on a case-by-case basis and mandated the submission of environmental impact statements for all major federal activities and projects. These statements are exhaustive studies that analyze a project's impact on the overall environment, thus giving citizens and public interest groups information to use in opposing unnecessary and inappropriate use of the nation's resources.

During the 1970s numerous other congressional acts expanded the role of the Federal Government in regulating the use of the environment and in guarding against pollution. The titles of some of these acts reflect the scope of federal involvement: Clean Air Act Amendments (1970), Resource Recovery Act (1970), Water Quality and Improvement Act (1970), Federal Water Pollution Control Act Amendments (1972), Noise Control Act (1972), Pesticide Control Act (1972), Clean Water Act (1974), Federal Environmental Pesticide Control Act Amendments (1975), Resource Conservation and Recovery Act (1976), Clean Air Act Amendments (1977), Clean Water Act Amendments (1977), Federal Water Pollution Control Act Amendments (1977), and Toxic Waste Superfund Act (1980).[14] Naturally, this abundance of legislation affected the work of the Corps of Engineers. In addition to filling its traditional role as an engineering and construction agency, in the 1980s the Corps became a primary planning and regulatory agency within the Federal Government. The Savannah District also was affected by this transformation.

Because of these changes in the political mood of the nation, the Corps of Engineers today performs various functions that are related only peripherally to navigation and defense. As guardian of the nation's waterways, the Corps is responsible for dealing with the problems of beach erosion control, hurricane protection, aquatic plant control, water pollution, water supply, water-oriented recreation, flood insurance, and other water-oriented activities. Beach erosion control involves restoring eroded shores, preserving them from future damage, and providing recreational benefits. Developing a plan to protect nonfederal properties is accomplished through cooperation between the Federal Government and appropriate state or local government agencies. Federal funding of beach erosion programs is based on the shore ownership and the resulting benefits. If no public use or benefit would follow, federal funds cannot be used. In addition, federal funding is limited to 70 percent of the cost of the program.

As authorized by Public Law 84-71, the Corps is conducting general surveys of the eastern and southern seaboards of the United States to identify problem areas and to determine the feasibility of hurricane protection projects.[15] Works found to be justified under this authorization are recommended to Congress for

project authorization and subsequent construction. Such projects may include raising dunes; constructing dikes, groins, seawalls, and breakwaters; and building dams or other types of barriers in estuaries with openings for navigation.

While hurricanes have caused catastrophic loss of life and property along the Atlantic and gulf coasts, the Corps has had other reasons to become involved in disaster relief. During the 1960s, as a result of the national tensions associated with the U.S.-Soviet conflicts, Civil Defense Programs were initiated throughout the country. The Department of the Army had primary responsibility for planning these programs. Because of its traditional planning function, the Corps provided primary assistance in this area. This Civil Defense responsibility took the form of surveying, locating, and identifying public fallout shelters in urban areas. When the perceived military crisis failed to materialize, these shelters became sites for general disaster relief during emergencies such as floods and storms. This function of the Corps abated in the 1970s when sufficient numbers of shelters had been identified and the international tensions eased.

The evolution of Corps work in disaster relief illustrates the close interrelationship which exists between the civil works mission and the military mission. This interrelationship is further exemplified in the cooperative work which the Corps of Engineers accomplishes for other federal agencies. In referring to this cooperative work, Lt. Gen. Bratton remarked in 1984 that "this arrangement provides a powerful strategic reserve for large-scale engineering services and construction management in the event of a major national emergency."[16] In addition to work with other Army commands, the Corps assists the Federal Emergency Management Agency (FEMA), the Environmental Protection Agency (EPA), the National Parks Service, the Department of Energy (DOE), and the Federal Energy Regulatory Commission. This assistance usually take the form of feasibility studies or surveys. Bratton has concluded, "We will continue to take on work for other federal government agencies whenever we have the applicable expertise and the necessary resources. We believe that doing so enhances our own capabilities while providing needed services to others."[17]

As a result of Corps' involvement in multipurpose river basin development during the 1950s and 1960s, the Engineers became responsible for providing hydroelectric power and recreation facilities to the nation. At the direction of Congress, the Corps has done surveys to determine the need for and feasibility of providing hydroelectric power in various parts of the nation. The resulting reports form the bases of congressional decisions on authorizing projects. Likewise, the activity of the Corps of Engineers in providing more and better recreational facilities on the reservoirs projects has been expanded. Public use facilities at these projects include boat-launching ramps, picnic areas, and camping areas with playground facilities and water and sanitary facilities at selected sites.

Interest in ecology and the quality of the natural environment, as expressed in the National Environmental Policy Act of 1969, also has provided a new area of activity for the Corps since about 1970. Under this act the Corps makes environmental studies and takes action in cooperation with the Council on Environmental Quality. The objectives are to preserve unique and important ecological, aesthetic, and cultural values; to conserve and use wisely the natural resources




*Buttermilk Sound Habitat Development site, an experimental salt-marsh replenishing project in coastal Georgia. This sign explains the project to the public. (Savannah District, Corps of Engineers)*

for the benefit of present and future generations; to enhance, maintain, and restore the natural and man-made environment; and to create new opportunities for the public to use and enjoy the environment.[18]

As a significant regulatory agent for the Federal Government, the Corps also has been charged in recent years with issuing permits in a broad range of situations that relate to maintaining the integrity of the nation's waterways. In the 1899 Rivers and Harbors Act, Congress first gave the Corps specific regulatory responsibility to protect navigation channels and harbors against encroachments.[19] Section 10 of this act prohibited obstructing or altering navigable waters of the United States without a permit from the Corps. Since the 1960s laws and court decisions have broadened the Corps Regulatory Function so that the full range of public interest relating to the protection and use of water resources is considered. For example, in 1968 the U.S. Supreme Court ruled that "public interest" factors must be considered in issuing permits for dredge and fill operations. The passage of the National Environmental Policy Act in 1969 required environmental impact statements prior to undertaking any major federal action, and this also has been applied to the issuance of permits. Other laws that may affect the processing of applications for Corps of Engineers permits include the Coastal Zone Management Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, the Deepwater Port Act, the Federal Power Act, the Marine Mammal Protection Act, and the National Fishing Enhancement Act of 1984.

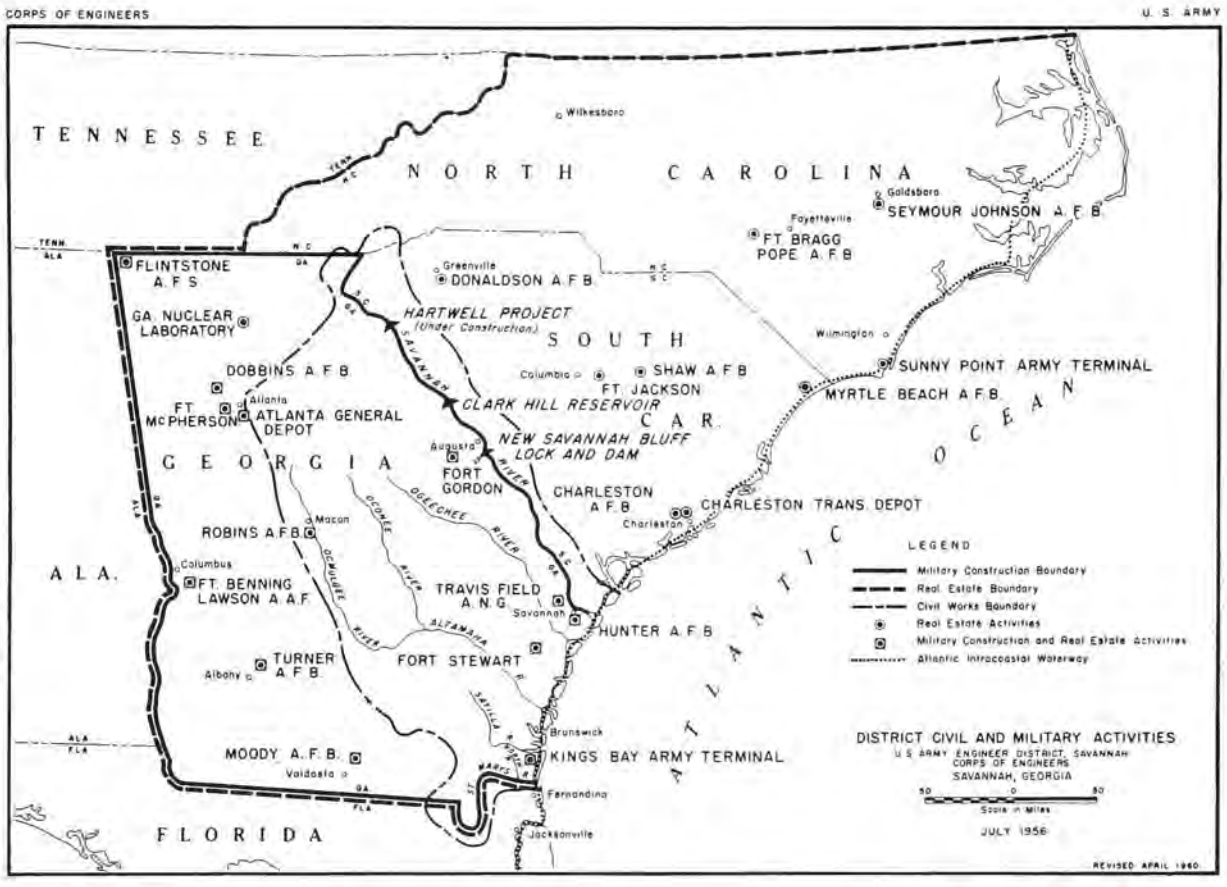
In 1972 Congress enacted amendments to the Federal Water Pollution Control Act; section 404 provided for Corps of Engineers jurisdiction over the



*Another view of the Buttermilk Sound Habitat Development site. Originally only ten sprigs of* Spartina alterniflora, *a marsh grass in coastal Georgia, were planted on the site. At the time of this photograph, over five times that number were growing. (Savannah District, Corps of Engineers)*

discharge of dredge and fill materials into navigable waterways.[20] This responsibility was applied initially to waters that were considered navigable and that were below the mean high-water line. This interpretation was challenged successfully in the federal courts, however, and in 1975 the Corps was directed to extend its regulatory authority to all waters in the United States. Since 1 July 1977 this section 404 authority has been exercised over all waters up to headwater streams having an average flow of 5 cubic feet per second or greater.[21] Obviously, this broadened responsibility has greatly increased the Corps' paperwork. In order to reduce the processing of individual permits, the Corps has introduced the use of nationwide general permits that require little or no processing. Separate Corps Districts also are authorized to issue regional general permits for certain types of minor works. This streamlining of the permit functions has been implemented by the Savannah District, which allows the District to concentrate its resources on major permit action relating to docks and other facilities for industry, government agencies, and harbor and waterway projects proposed in its area of regulatory responsibility. This area includes Georgia and the Atlantic Ocean to the limits of the outer continental shelf.

In terms of its civil works, the territorial boundaries of the Savannah District changed only slightly over the years from what they had been prior to World War II. Basically, until 1966 the District included the coastal region from just below Port Royal, South Carolina, to Fernandina Harbor, Florida. Then Fernandina Harbor was transferred to the Jacksonville District, and the Savannah District's southern boundary was set at Cumberland Sound. The Atlantic




*Map of the Savannah District's boundaries as of July 1956. (Savannah District, Corps of Engineers)*

Intracoastal Waterway and all harbors, sounds, estuaries, and beaches between Port Royal and Cumberland Sound were included. All watersheds in Georgia tributary to the Atlantic Ocean were likewise defined as part of the territory. Because this included the Savannah River, the District's responsibility reached up into a small section of North Carolina and a significant part of South Carolina, as well as into most of the eastern half of Georgia. The St. Marys River forming the Georgia-Florida boundary also remained under the Savannah District, thus extending the District's jurisdiction down into extreme north Florida.

Since the early 1960s the District has carried out civil works functions for other Districts as well. In 1961 the Wilmington, North Carolina District and the Charleston, South Carolina, District were converted into "operating districts" with the Savannah District as their "support district." This meant that Wilmington and Charleston were to maintain merely "the operation, direction, supervision and administration of Civil Works in their respective areas," but the Savannah District Office was responsible for administrative and technical support. This placed Savannah in charge of project design; accounting and fiscal records; and personnel, legal, and supply support.[22]

Some problems arose over this division of authority. The history of the Wilmington District tells of the construction of the New Hope Dam and Reservoir in North Carolina, later renamed the B. Everett Jordan Dam and Lake, where the Savannah Engineers had control of design and the Wilmington District was assigned construction. "Wilmington personnel were held responsible for Savannah's design and had to answer to the contractors when questions arose." This relationship between the two Districts has been modified in recent years as the Wilmington District Office has begun to do more of its own design work.[23] The Savannah Engineers also have provided design work for the John Redman Dam under the Tulsa District, the Yazoo Backwater Project for the Vicksburg District, the Pearl River Lock and Dam at the Mississippi Test Facility for the Mobile District, bridges over the now defunct Cross-Florida Barge Canal for the Jacksonville District, and, most significantly, both design and construction at the West Point Dam on the Chattahoochee River for the Mobile District.[24]

While civil works and regulatory functions have been part of the Savannah District's responsibilities and activities since World War II, this District has been defined geographically in two other ways. For example, the transfer of military construction beginning in 1940 created military boundaries at times vastly different from those for civil projects. This shifting of the military boundaries continued throughout the 1940s, the details of which are spelled out in later chapters. Eventually Savannah had charge of Army and later Air Force construction not only in Georgia but in South Carolina, North Carolina, and parts of Tennessee and Florida as well.

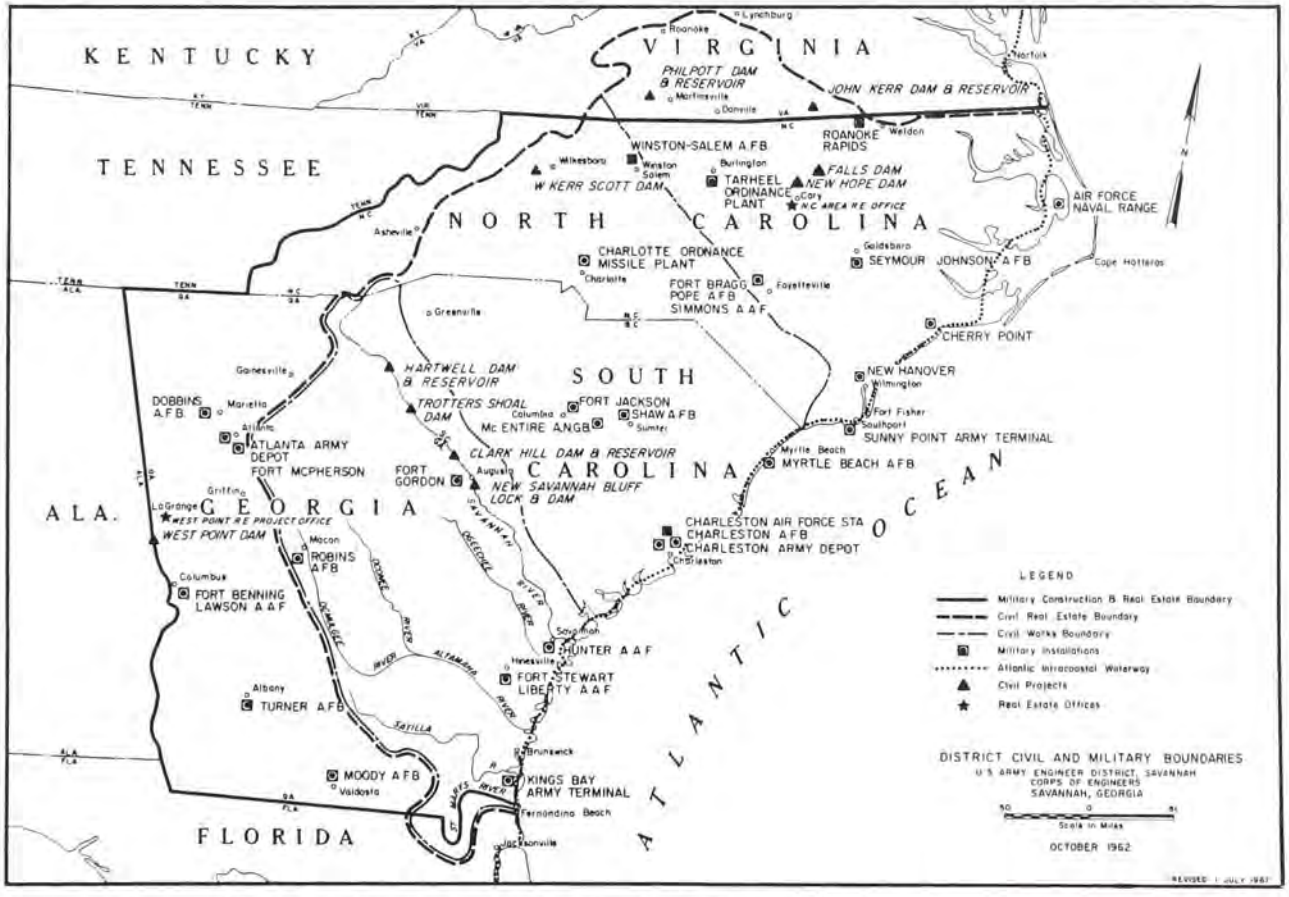
The Korean War brought such dramatic boundary changes throughout most of the 1950s that only the state of Georgia was under Savannah's military construction authority. Then in 1961 the Secretary of the Army directed that Army and Air Force projects in North Carolina and South Carolina as well as all those in Georgia be placed under the Savannah District Engineer. This has continued to be the case except for some Air Force construction in South

Carolina and Turner Air Force Base in Georgia, both of which were transferred to the Navy.

The Savannah District is defined also in terms of real estate boundaries. Prior to 1947 the South Atlantic Division Office administered real estate affairs in this region. In that year the Real Estate Division was created in the Savannah District Office to handle real estate matters for civil and military projects in Georgia, South Carolina, and North Carolina. In 1961 the real estate boundaries were extended up into part of Virginia. At that time the Roanoke River Basin, including the John H. Kerr and Philpott reservoirs, had been transferred to the Wilmington District from the Norfolk District, thus placing real estate matters there under Savannah. By definition, "the Real Estate Division at the District level is the operational agency for the acquisition of estates in property and the management and disposal of real property."[25] The Real Estate Division has been extensively involved in land acquisition and land management for dams and reservoirs such as the Strom Thurmond (formerly Clark Hill), Hartwell, Richard B. Russell (formerly Trotters Shoals), and West Point projects in Georgia; New Hope and Falls Lake projects in North Carolina; and the John H. Kerr project in Virginia.[26] This Division's military role has been even more extensive in light of the Savannah District's responsibility for military work in three states.




*Map of the Savannah District's boundaries as of 1989. (Savannah District, Corps of Engineers)*




*Map of the Savannah District's boundaries as of October 1962. (Savannah District, Corps of Engineers)*



*Walter M. Lucas, Principal Engineer, Civil Operations Section, 1943. (Savannah District, Corps of Engineers)*

The expansion of both the District's geographical area and the types and range of responsibilities brought an accompanying increase in the staff and numerous changes in its organizational structure. In January 1944 two civil works divisions were formed: a Civil Operations Division under Walter M. Lucas and an Engineering Division under Ralph F. Rhodes. An Administrative Division headed by George R. Forman handled records, payroll, and other fiscal matters; contracts; and safety matters. The Posts, Camps and Army Airfields Division supervised by Major Hue Thomas performed the military tasks, supported by a Military Supply Section directed by Carl W. Robeson.[27]

Demobilization after the war brought numerous organizational changes in the late 1940s. As already noted, the Real Estate Division was created in 1947. Two years earlier operations and construction were combined into one division under Charles F. Trainor to supervise postwar military construction and maintenance. However, the unprecedented workload associated with the Clark Hill and Hartwell Dam projects restored the separation of the two functions in 1950.[28] The Korean War necessitated further modifications. As of January 1952, the organizational structure included four technical divisions: the Construction Division, which included the Civil Construction and the Military Construction Branches; the Engineering Division, itself subdivided into six units; the Operations Division; and the Real Estate Division. The administrative staff functions were carried out by the Fiscal, Legal, Office Services,



*Ralph Rhodes, Principal Engineer, Rivers and Harbors Engineering Section, 1943. (Savannah District, Corps of Engineers)*

Personnel, and Supply Branches.[29]

Over the last 30 years, the increasingly complex mission of the Corps of Engineers has demanded regular changes in District organization, which has created new divisions, branches, and offices. As of February 1989, the six technical divisions included Engineering, Planning, Operations, Real Estate, Construction, and Emergency Management. The eleven advisory and support staff offices were Special Assistants, Resource Management, Safety and Occupational Health, Security and Law Enforcement, Internal Review, Office of Counsel, Programs Management, Public Affairs, Logistics Management, Information Management, and Contracting Division.[30]

By 1952 the District had outgrown its space in the Savannah Post Office, which it had occupied since 1900. The headquarters was moved into the new Castle Building on East St. Julian Street. Having outgrown this building, in early 1986 the District made another move, this time to the largest of three buildings in the newly constructed Juliette Gordon Low Federal Building Complex on Telfair Square in downtown Savannah.

Despite employee cutbacks such as those in the late 1950s, the staff has continued to increase. By the summer of 1964 the Savannah District had 800 civilian employees and two military officers. Of these, 421 worked directly out of the Savannah District Office and the remainder worked in the field offices.[31]

By 1978 the staff totaled more than 1,000. Staffing of the legal office is a case in point. During World War II, the Chief of Engineers' office gave legal assistance. Following the war the District assumed charge of its own legal matters, and one attorney did the job. By 1968 four lawyers were needed, and by 1981 the office had eight.[32]

In late 1988 the Savannah District felt the impact of a Reduction in Force



*The Savannah District Engineer, Col. Wilson B. Higgins (front row, center) and the Savannah office staff, October 1945. Front row: (left to right) G. R. Forman. Fiscal Officer; Capt. F. H. Eldred, Personnel Officer; Maj. A. M. Northington, Chief, Contract Termination; Maj. R. C. Griffin, Technical Information Officer; Col. Higgins; Maj. A. M. Koplin, Executive Officer; Capt. C. E. Wood, Property Officer; Lt. Col. Hue Thomas, Chief, Military Engineering Division; Lt. J. P. McGarty, Electrical Section. Second row: Otis M. Sanders, Safety Engineer; W. J. Crump, Office Service Branch; Maj. W. S. Wojtczak, Chief, Military Construction Branch; Capt. J. L. Callaway, Military Construction Branch; Maj. E. B. Boynton, Resident Engineer, Warner Robins; Lt. J. H. Neely, Legal Officer; Lt. B. Simon, Assistant Legal Officer. Third row: D. H. Kalbach, Assistant Chief, Procurement and Contracts; Capt. C. F. Kimball, Chief, Procurement and Contracts; Capt. S. A. Tomlinson, Chief, Paving Section; Lt. W. F. Worsham, Contract Termination; Capt. O. B. Dold, Contract Termination; Capt. T. E. Wilson, Resident Engineer, Chatham Field; Capt. K. L. Bolin, Resident Engineer, Ft. Bragg; Lt. C. A. Hagelin, Project Engineer, Camp Butler. Fourth row: Capt. Jules D. Levin, Resident Engineer, Augusta; Capt. A. H. Wade, Resident Engineer, Chattanooga; Capt. R. D. Elkins, Contract Termination Division; Capt. R. G. Ray, Custodial Officer, Camp Murphy, Florida; Capt. F. D. Mendenhall, Resident Engineer, Tampa, Florida; Capt. B. W. Ingram, Surplus Materials Officer; Capt. E. F. Britt, Surplus Facilities Officer; Capt. E. D. Tracy, Assistant Resident Engineer, Augusta. Fifth row: Alexander Scott, Labor Relations; J. W. Corbitt, Equipment Section; Capt. J. B. Hamlin, Mechanical Section; Capt. S. B. Earle, Military Construction Branch; Maj. C. J. Senerchia, Resident Engineer, Daytona Beach, Florida; Lt. Jack D. Kemp, Assistant Resident Engineer, Daytona Beach, Florida; Ralph Rhodes, Civil Engineering Division. (Savannah District, Corps of Engineers)*




*The Castle Building. This became the headquarters of the Savannah District in 1952. (Savannah District, Corps of Engineers, 1962)*

(RIF) similar to that experienced in other engineer districts. The anticipated workload simply would not justify maintaining the workforce at current levels. The reduction in military projects was the obvious explanation. Col. Ralph V. Locurcio, the current District Engineer, explained the problem: "The challenge before us now is to re-size the district to accommodate a more normal military workload. . . ."[33] Others feared a decrease in civil works projects as well. Overall, the RIF was explained rather simply: "In fact, projections indicate that our workload will be down for the next four years, so we *have to* buy into this very costly reduction in force in order for the three or four years after this to be within the funding that the district expects to receive."[34]

The changes in the Savannah District necessarily have brought some depersonalization. Prior to the 1930s, the District Engineer was involved in every detail of the District's actions. Assisted by civilian or military engineers, he wrote the reports on surveys and examinations sent to higher authorities. The growth of civil projects and the addition of numerous other responsibilities, plus the enormous expansion of the military functions in the post-World War II

years, have demanded a larger workforce. Furthermore, the District Engineers of the last several decades have relied more and more on those civilians who head the various divisions and branches. District Engineers have assumed the role of administrators of the vast operations of the District and are less able to participate in the day-to-day operations. The Savannah District Engineer's changing role also has been dictated by the fact that tours of duty generally have been limited to less than three years, while many of the District's projects have required much longer to carry out. Thus the civilian staff has provided the continuity through the years.

In the 1970s the Corps revamped its decisionmaking processes to include the views of other government agencies and the general public in the planning, design, and construction phases and even in operation and maintenance programs. The last several Savannah District Engineers have devoted a great deal of time and travel to studying issues and answering questions raised by private citizens and non-Corps agencies at all levels of government. Thus an organization that may be perceived by some as impersonal and bureaucratic because of its size has continued to respond to the interests and concerns of those affected by the work of the Savannah District.



*An aerial view of the Savannah District's Depot on Hutchinson Island across the Savannah River from the City of Savannah, Mar. 1968. (Savannah District, Corps of Engineers)*



*Col. Peter A. Feringa, Savannah District Engineer, 1941-1943. (Savannah District, Corps of Engineers)*



*Maj. Huguenin Thomas, Jr., Savannah District Engineer, 1944. (Savannah District, Corps of Engineers)*



*Col. Clifford T. Hunt, Savannah District Engineer, 1944-1945. (Savannah District, Corps of Engineers)*



*Col. Wilson B. Higgins, Savannah District Engineer, 1945-1946. (Savannah District, Corps of Engineers)*



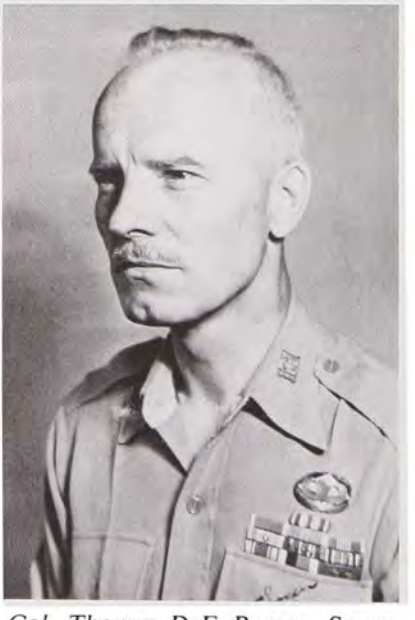
*Col. Paschal N. Strong, Jr., Savannah District Engineer, 1946-1949. (Savannah District, Corps of Engineers)*



*Col. Robert Erlenkotter, Savannah District Engineer, 1949-1952. (Savannah District, Corps of Engineers)*



*Col. Ellis E. Wilhoyt, Jr., Savannah District Engineer, 1952-1954. (Savannah District, Corps of Engineers)*



*Col. Thomas DeF. Rogers, Savannah District Engineer, 1954-1956. (Savannah District, Corps of Engineers)*



*Col. Robert C. Bahr, Savannah District Engineer, 1956-1959. (Savannah District, Corps of Engineers)*



*Col. Wilbur A. Stevens, Savannah District Engineer, 1959-1962. (Savannah District, Corps of Engineers)*



*Col. Jack R. Harris, Savannah District Engineer, 1962-1963. (Savannah District, Corps of Engineers)*



*Col. Paul W. Ramee, Savannah District Engineer, 1963-1966. (Savannah District, Corps of Engineers)*



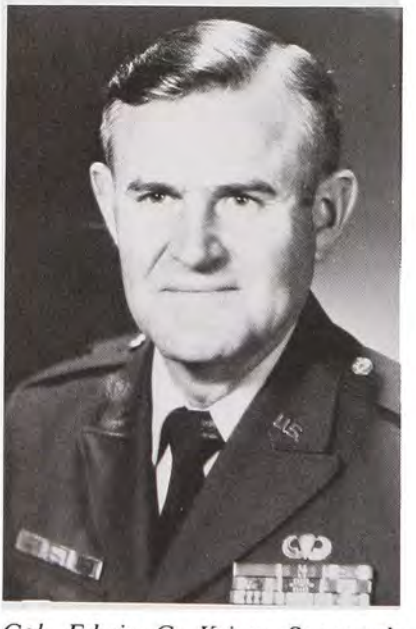

*Col. William L. Barnes, Savannah District Engineer, 1966-1968. (Savannah District, Corps of Engineers)*




*Col. John S. Egbert, Savannah District Engineer, 1968-1970. (Savannah District, Corps of Engineers)*



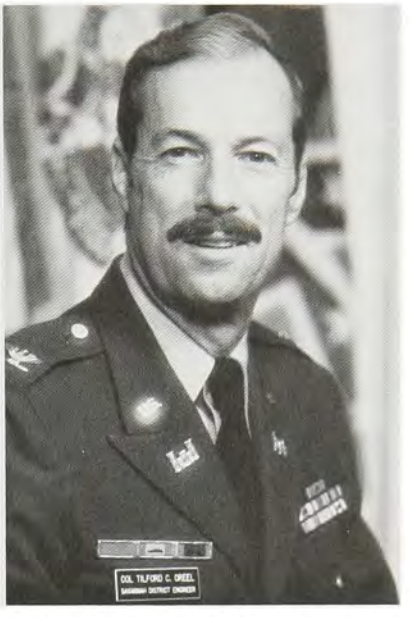
*Col. Howard L. Strohecker, Savannah District Engineer, 1970-1973. (Savannah District, Corps of Engineers)*



*Col. Edwin C. Keiser, Savannah District Engineer, 1973-1976. (Savannah District, Corps of Engineers)*




*Col. Frank Walter, Savannah District Engineer, 1976-1978. (Savannah District, Corps of Engineers)*



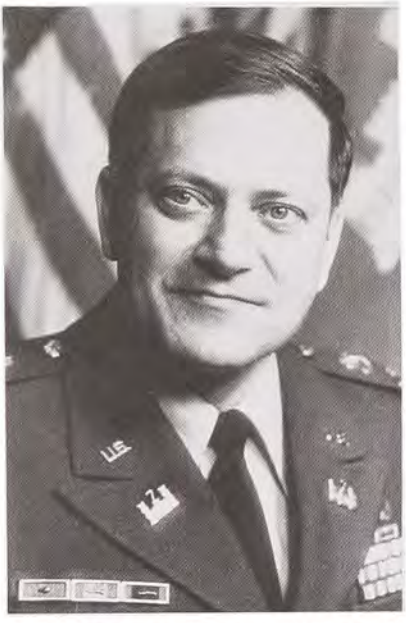
*Col. Tilford C. Creel, Savannah District Engineer, 1978-1981. (Savannah District, Corps of Engineers)*



*Col. Charles E. Dominy, Savannah District Engineer, 1981-1983. (Savannah District, Corps of Engineers)*



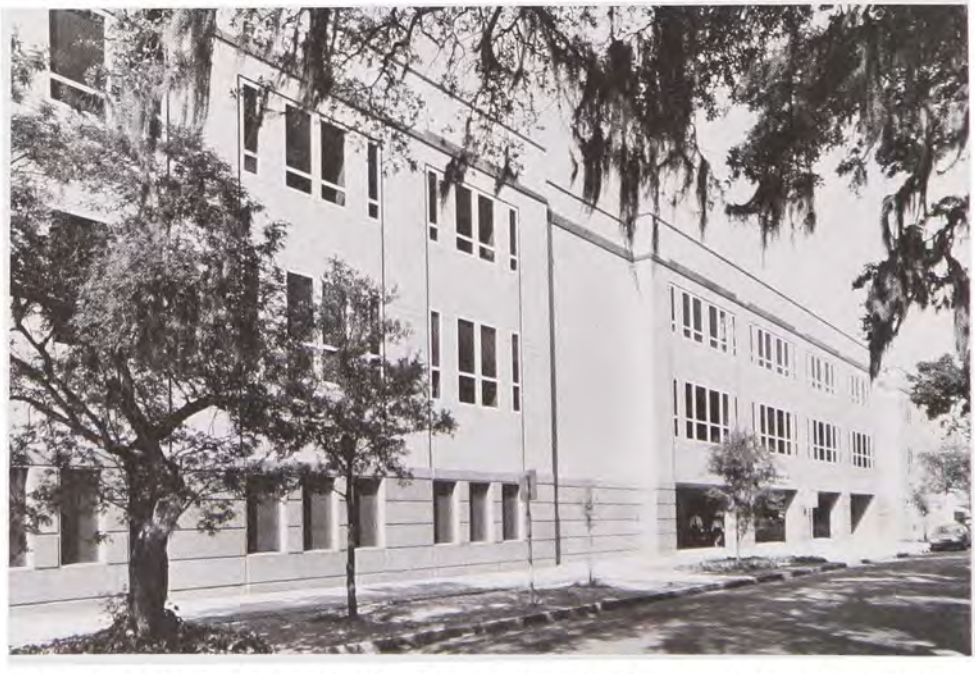
*Col. Daniel W. Christman, Savannah District Engineer, 1983-1986. (Savannah District, Corps of Engineers)*



*Col. Stanley G. Genega, Savannah District Engineer, 1986-1988. (Savannah District, Corps of Engineers)*




*Col. Ralph V. Locurcio, Savannah District Engineer, 1988-Present. (Savannah District, Corps of Engineers)*



*The Juliette Gordon Low Federal Building, present headquarters of the Savannah District. (Savannah District, Corps of Engineers)*

## SAVANNAH DISTRICT PERSONNEL STRENGTH, FY 1980-FY 1989

| | Military | Civil | Total | District Office Only |
|---|---|---|---|---|
| FY 1980 | 513 | 620 | 1,133 | 794 |
| FY 1981 | 526 | 594 | 1,120 | 845 |
| FY 1982 | 562 | 544 | 1,106 | 834 |
| FY 1983 | 513 | 626 | 1,139 | 737 |
| FY 1984 | 564 | 537 | 1,101 | 748 |
| FY 1985 | 622 | 548 | 1,170 | 783 |
| FY 1986 | 623 | 551 | 1,174 | 774 |
| FY 1987 | 675 | 487 | 1,162 | 616 |
| FY 1988 | 653 | 502 | 1,155 | 828 |
| FY 1989 | 511 | 465 | 976 | 704 |

# SAVANNAH DISTRICT EXECUTIVE OFFICE

COL RALPH V. LOCURCIO — COMMANDER — CESAS–DE
EXT 5226

LTC HOWARD L. HELLERSTEDT — DEPUTY COMMANDER — CESAS–DD–M
EXT 5225

MAJ E. RANDOLPH MARSHALL — DEPUTY COMMANDER — CESAS–DD–C
EXT 5225

KITTY BURNS — ADMIN OFFICER — CESAS–DX
EXT 5122

P.O. BOX 889
SAVANNAH,GA 31402–0889

COMM: (912) 944 + EXT
AUTOVON: 971–6330

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## SPECIAL ASSISTANTS

C. L. DAVIS — VALUE ENGINEERING OFFICER — CESAS–VE
EXT 3331

M. B. BEACHAM — SMALL & DISADVANTAGED BUSINESS UTILIZATION ADVISOR — CESAS–SB
EXT 3067

L. T. WORRELL — EQUAL EMPLOYMENT OPPORTUNITY OFFICER — CESAS–EE
EXT 3333

VACANT — LIFE CYCLE PROJECT MANAGEMENT OFFICER — CESAS–LC
EXT 3225

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## BOARDS & COMMITTEES

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## RESIDENT OFFICES

### OCE VALUE ENGINEERING STUDY TEAM

M. A. BANDY — CHIEF — CEEC–V–T
EXT 3448

### SAD RESIDENT AUDIT OFFICE

W. L. DURDEN — CHIEF — CESAD–AO–KS
EXT 3480

### SAD RESIDENT PERSONNEL SAVANNAH OPERATING BRANCH

M. E. CAGGIANO — CHIEF — CESAD–EP–S
EXT 3859

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## RESOURCE MANAGEMENT OFFICE

C. A. METTE — CHIEF — CESAS–RM
EXT 5365

VACANT — DEPUTY CHIEF — CESAS–RM–X
EXT 5365

### MANAGEMENT & MANPOWER ANALYSIS BRANCH

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### BUDGET BRANCH

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EXT 3727

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R. W. STOKES — CHIEF — CESAS–PM
EXT 3500

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## INTERNAL REVIEW OFFICE

V. STELL–BURNS — CHIEF — CESAS–IR
EXT 3308

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## OFFICE OF COUNSEL

W. A. HOUGH — DIST COUNSEL — CESAS–OC
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EXT 3776

### SUPPLY BRANCH

E. D. FLANDERS — CHIEF — CESAS–LM–S
EXT 3074

### TRANSPORTATION BRANCH

K. F. WEIRICH — CHIEF — CESAS–LM–T
EXT 3305

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EXT 3147

### INFORMATION REQUIREMENTS & PLANNING BRANCH

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EXT 3147

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### CUSTOMER ASSISTANCE CENTER

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EXT 3948

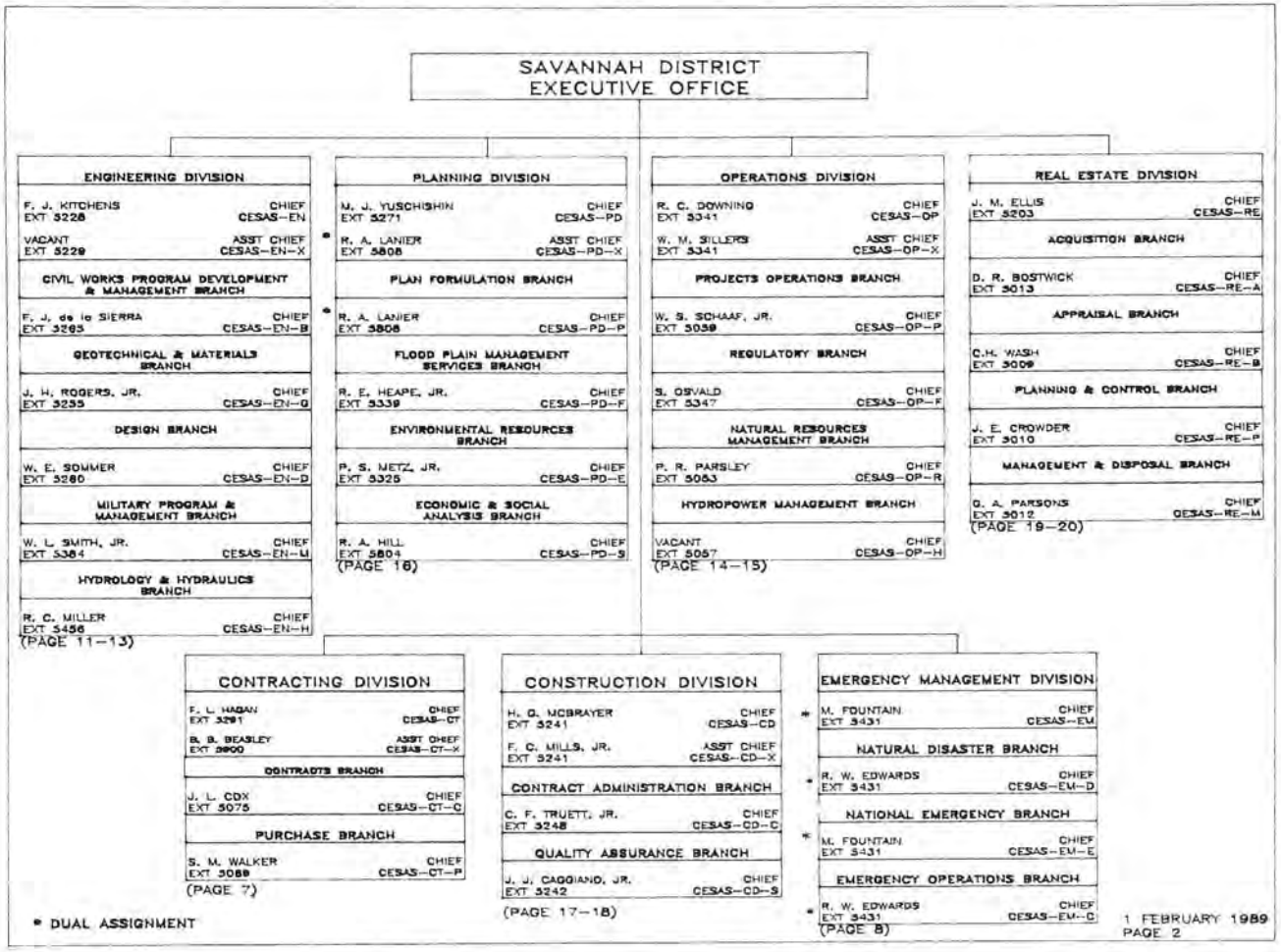
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COLONEL, CORPS OF ENGINEERS
COMMANDING

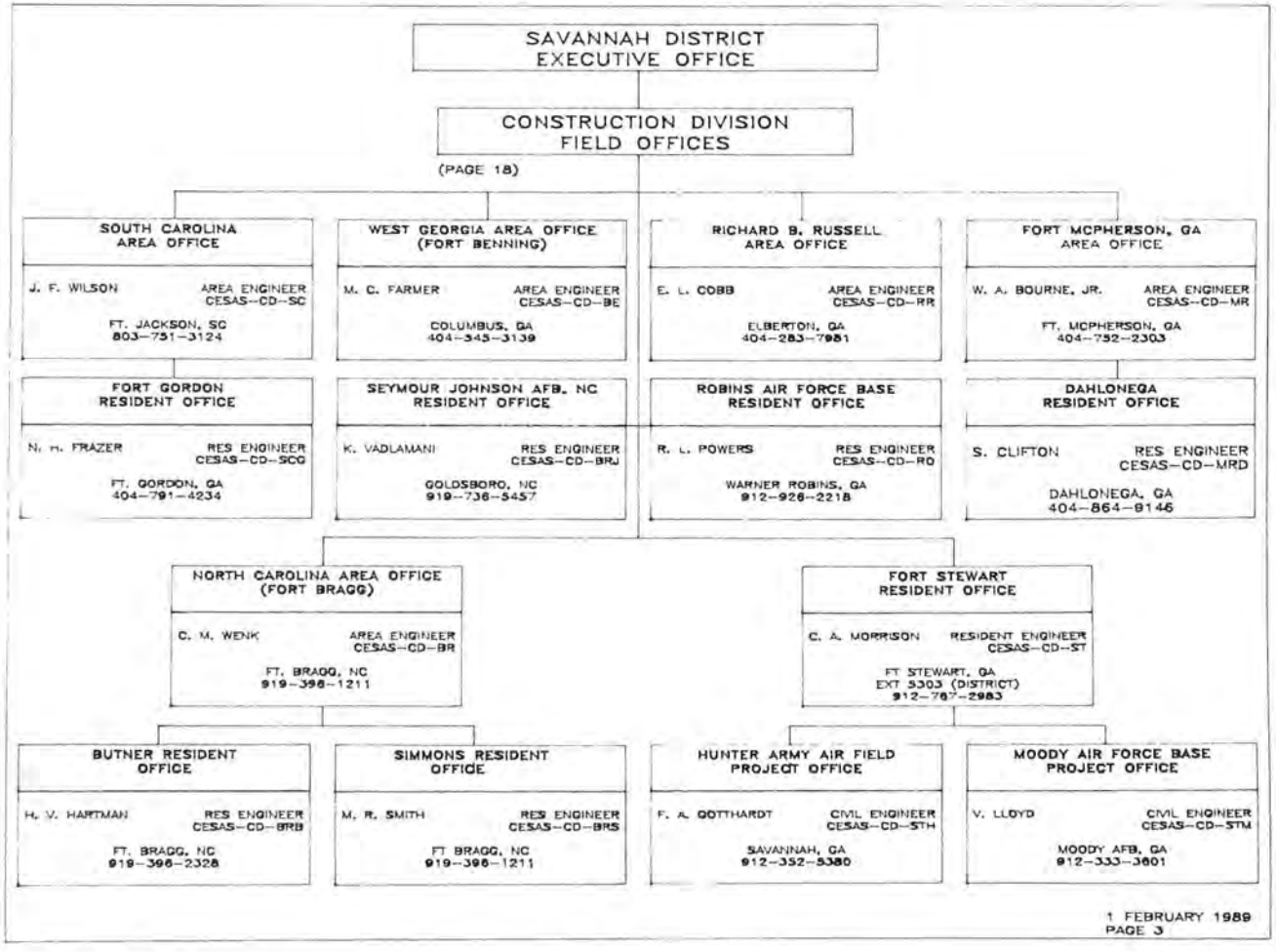
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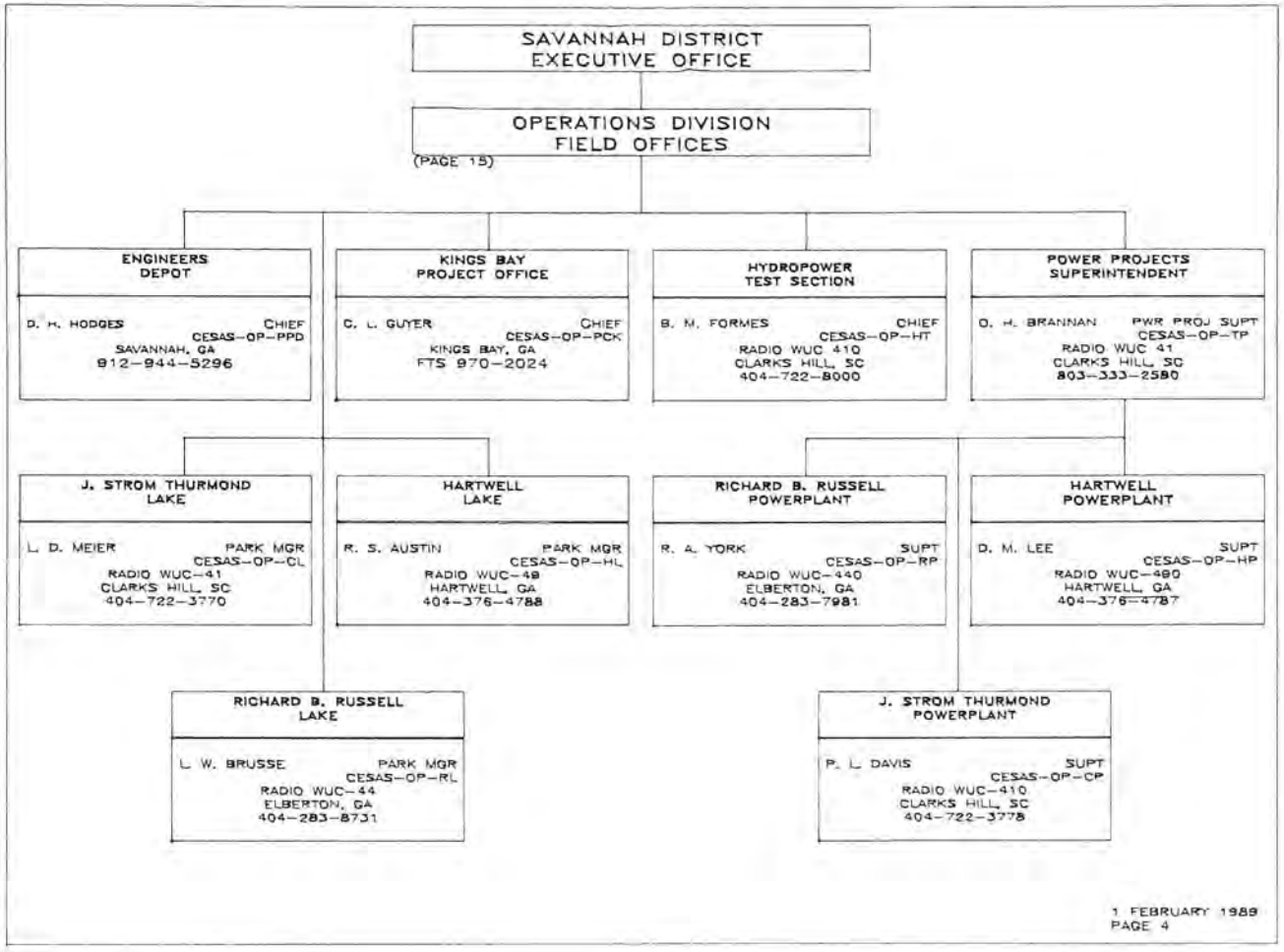
# SAVANNAH DISTRICT
# EXECUTIVE OFFICE



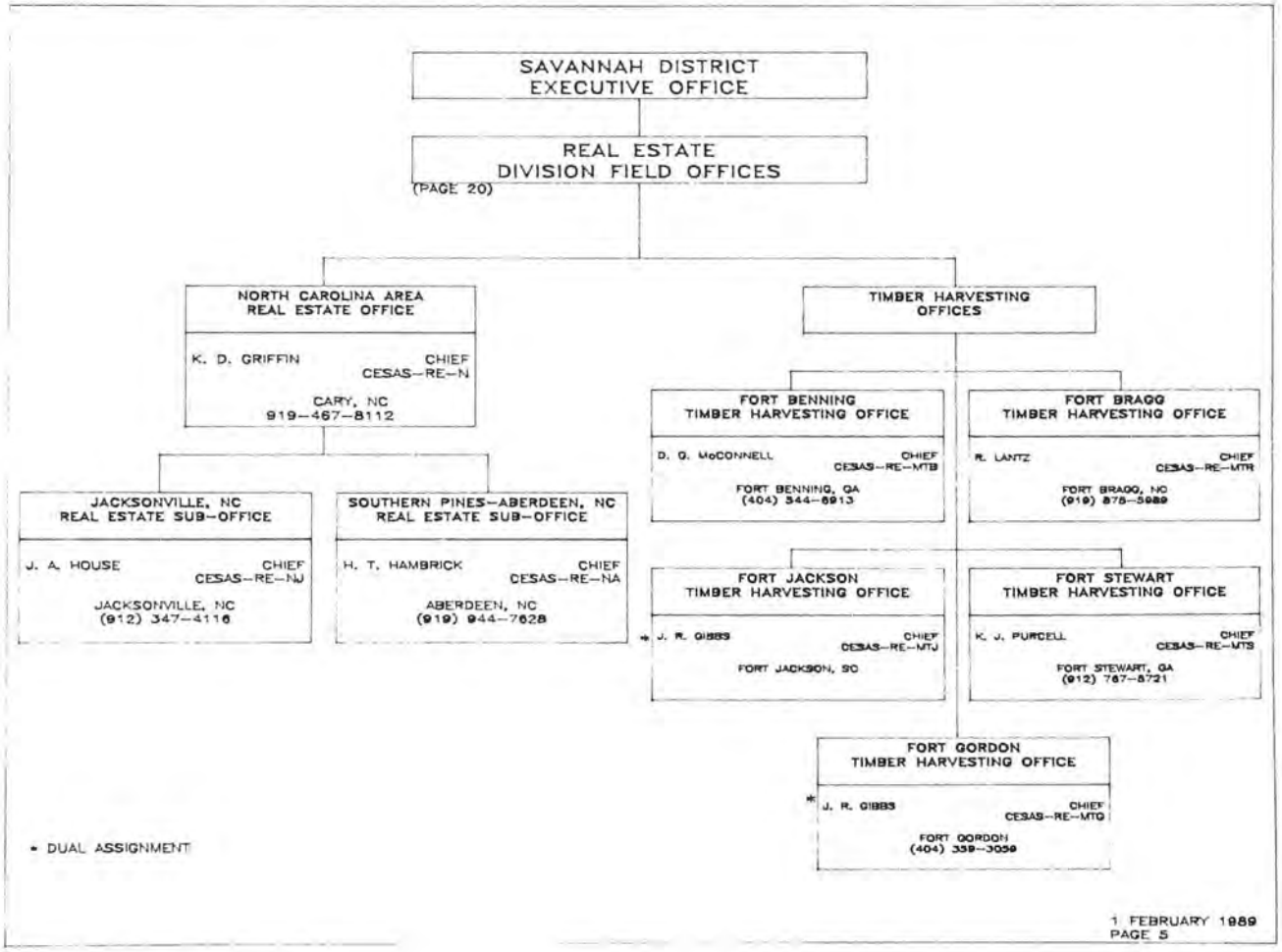

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SAVANNAH DISTRICT
EXECUTIVE OFFICE
CONSTRUCTION DIVISION
FIELD OFFICES
(PAGE 18)
SOUTH CAROLINA
AREA OFFICE
J. F. WILSON
AREA ENGINEER
CESAS-CD-SC
FT. JACKSON, SC
803-751-3124
WEST GEORGIA AREA OFFICE
(FORT BENNING)
M. C. FARMER
AREA ENGINEER
CESAS-CD-BE
COLUMBUS, GA
404-545-3139
RICHARD B. RUSSELL
AREA OFFICE
E. L. COBB
AREA ENGINEER
CESAS-CD-RR
ELBERTON, GA
404-283-7981
FORT MCPHERSON, GA
AREA OFFICE
W. A. BOURNE, JR.
AREA ENGINEER
CESAS-CD-MR
FT. MCPHERSON, GA
404-752-2303
FORT GORDON
RESIDENT OFFICE
N. H. FRAZER
RES ENGINEER
CESAS-CD-SCG
FT. GORDON, GA
404-791-4234
SEYMOUR JOHNSON AFB, NC
RESIDENT OFFICE
K. VADLAMANI
RES ENGINEER
CESAS-CD-BRJ
GOLDSBORO, NC
919-736-5457
ROBINS AIR FORCE BASE
RESIDENT OFFICE
R. L. POWERS
RES ENGINEER
CESAS-CD-RO
WARNER ROBINS, GA
912-926-2218
DAHLONEGA
RESIDENT OFFICE
S. CLIFTON
RES ENGINEER
CESAS-CD-MRD
DAHLONEGA, GA
404-864-9146
NORTH CAROLINA AREA OFFICE
(FORT BRAGG)
C. M. WENK
AREA ENGINEER
CESAS-CD-BR
FT. BRAGG, NC
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FORT STEWART
RESIDENT OFFICE
C. A. MORRISON
RESIDENT ENGINEER
CESAS-CD-ST
FT STEWART, GA
EXT 5303 (DISTRICT)
912-767-2983
BUTNER RESIDENT
OFFICE
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CESAS-CD-BRB
FT. BRAGG, NC
919-396-2328
SIMMONS RESIDENT
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REAL ESTATE
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(PAGE 20)
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REAL ESTATE OFFICE
K. D. GRIFFIN
CHIEF
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JACKSONVILLE, NC
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# 11 THE MILITARY ROLE IN WORLD WAR II

In times of both war and peace, the Corps of Engineers long had been known as the Army's engineering and construction arm. For decades the Corps had been responsible for coastline fortifications and defense. Gradually, that responsibility became largely a support role for the Coast Artillery Corps, and the Engineers were charged only with maintaining coastline defense establishments and outdated Forts. During World War I the Construction Division, which evolved out of the Quartermaster Corps (QMC), supervised all military construction. Then, in an atmosphere of rivalry and competition between the Corps of Engineers and the Quartermaster Corps for military construction, Congress in 1920 created the Construction Service in the Quartermaster Corps. This organization was responsible for all military construction except fortifications, which were left in the care of the Corps of Engineers. Hence, for the next 20 years the Corps of Engineers was involved exclusively in civil works except for upkeep of Forts, a role hardly in keeping with its earlier history.[1]

Between the two wars the Quartermaster Corps' military construction activity had been limited. In fact, the entire military establishment had been cut back in those years, minimizing the need for any significant new construction. Generally, the QMC had done little more than build a few barracks and mess halls and some officers' homes.[2] The Corps of Engineers, on the other hand, had accrued extensive and varied experience in major construction operations in its ongoing civil projects work. Consequently, as the military preparedness program got under way in 1940, Congress transferred the responsibility for planning, designing, and constructing airfields for the Army Air Corps from the QMC to the Corps of Engineers. The Engineers likewise were given charge of airports initially placed under the control and authority of the Civil Aeronautics Administration (CAA). The Savannah District faced a tremendous task because of the number of airfields that were assigned to it. The geography of the District, with its vast rural and generally flat land, made the area especially attractive for airfield construction. Moreover, a good supply of reasonable labor was available for the projects there, and the people of the region were eager to attract military bases to their section of the country.[3]

The Savannah District Office eventually would construct or expand some 25 CAA airfields in Georgia and South Carolina. Although many were small, others were large and served some commercial functions. All were located

within 200 miles of the coast and were intended to play a role in coastal defense. They were, in fact, "interceptor fields prepared for defense against an unexpected German bomber attack."[4] Such bases were located in Savannah, Vidalia-Lyons, Sylvania, Statesboro, Moultrie, Valdosta, Waycross, Alma, Americus, Albany, Gainesville, Athens, Tifton, Dublin, and St. Simons Island in Georgia and in Aiken, Greenwood, Barnwell, and Anderson, South Carolina. The actual construction was done under contract, but the Savannah District was responsible for and supervised all aspects of the work from initial surveys to building access roads, from grading and paving runways and aprons to constructing temporary tarpaper and sheetrock administrative buildings 20 feet wide and 100 feet long. The projects rarely included facilities to accommodate troops. Five of these airfields were later converted to full-scale Army Air Corps installations.[5]

Despite the Corps of Engineers' background, design and construction of runways was a challenge. For example, the original design for the CAA field at Dublin, Georgia, called for using a tar base with a tar topping. Further investigation, however, indicated that a limestone base topped with a tar surface would provide a firmer runway. Lessons learned in the construction of these projects later enabled the Corps to build a small airfield with runway and apron in as little as two weeks.[6] Major Peter A. Feringa, who became District Engineer in Savannah in December 1941, reported that as of then the work of paving CAA airports was at its heaviest and would continue to be a major concern of the District for some time.[7]

The Savannah Engineers' first work in Army Air Corps construction was on four airfields. Two of them were originally municipal airports that had been transferred to military use in 1940: Daniel Field in Augusta and Hunter Field, also known at one time as Savannah Army Air Base, in Savannah. The Corps carried out new construction at these bases, normally by contract, which included expanding runways and building such structures as barracks, mess halls, hangars, warehouses, shops, and even hospital facilities.[8]

The other two airfields in this initial group were south of Macon, Georgia, and they were built in their entirety by the Savannah District. Cochran Field was the first. Authority to build "Flying School No. 1, Macon, Georgia," was granted 8 February 1941, and construction began in March. The field was known briefly as Avondale Army Air Force Base because of the little community nearby. However, in June 1941 the facility was renamed Cochran Field in honor of Lieutenant Robert J. Cochran of Camilla, Georgia, a World War I flyer killed in action. The first contracts let by the District called for construction of initial buildings, including accommodations for personnel, and grading and paving of runways and parking aprons. The original project provided for construction of 11 administrative buildings; 13 cadets' barracks; 35 enlisted men's barracks; 4 officers' barracks; 6 mess halls; 13 supply buildings; 10 warehouses; 16 hospital buildings; 40 other buildings, including a guardhouse and bombsite building; 2 water tanks; 6 underground gasoline and oil storage tanks; a water-supply system; a sewer system and treatment plant; and paved streets and walks. The project also included clearing, draining, grading, and constructing a landing field. The landing field was to include two taxiways, one 100 feet wide and 850 long and the other 100 feet wide and 900 long; two



*The Base Hospital Area at "Flying School No. 1, Macon, Georgia," renamed Cochran Field in June 1941. The Savannah District built this hospital complex in the World War II style of several buildings connected by open but covered walkways. Such hospitals were built at other Army installations during the war and were used for several decades after the war was over. (Washington Memorial Library, Macon, Georgia)*

runways 300 feet wide and 4,500 feet long; and a parking apron 450 feet wide and 2,400 feet long. By 1 October 1941 this round of construction was almost finished. However, additional buildings were called for, which necessitated additional construction on into 1942, including the first hangars that were not part of the original contract.[9] The base was used as a training field for both Americans and British Air Cadets.[10] In March 1945 it was placed in a temporary inactive status and used as a convalescent center for Army Air Corps troops and officers returning from Europe. After the surrender of Japan, it was used as a military separation center until the following December, when both the center and the hospital were closed. Eventually, the property was declared surplus and sold to the city of Macon for one dollar. It now is the municipal airport of Macon.[11]

A few months after starting work at Cochran Field, the Savannah District began constructing Robins Field near Macon. In early 1941 the government announced its intentions to build an Army Air Corps maintenance and supply depot in the Southeast. The people of Macon had campaigned actively to have this Army Air Corps depot located in their area despite competition from such cities as Atlanta, Nashville, and Chattanooga. On 14 June 1941 the War Department announced the selection of a site at Wellston, a tiny crossroads hamlet with a population of 52. The depot would be approximately 18 miles south of Macon and only 8 miles from Cochran Field.[12]

Major Robert H. Elliott, who had helped select the Wellston location, was appointed Area Engineer to supervise the Corps of Engineers project at the new base. He served from 1 June to 15 November 1941. The actual construction was

done by contractors using local labor as much as possible. However, the Savannah District Engineers were charged with design, supervision, and inspection of work. Elliott was followed by Major Henry G. Gerdes, Area Engineer from 15 November 1941 to 15 November 1942. Charles W. Griscom, a civilian employee of the Corps before he was commissioned in June 1942, served under Gerdes. Griscom supervised construction in late 1941 and in 1942. Major E.B. Boynton succeeded Gerdes as Area Engineer.[13]

Just 10 days after the War Department announcement, Elliott and Colonel Frederick W. Altstaetter, then in a second tour of duty as Savannah District Engineer, came to Wellston to get the project under way. The city of Macon was to provide the land, and the deed to the first tract was presented to the Corps on 20 August. A second deed followed in March 1942, for a total land transfer of 3,108.5 acres.[14] Engineer headquarters were set up temporarily at the Avondale Airfield. Savannah District personnel began the planning process, which included drawing maps and selecting building sites. The first contracts were let on 8 August 1941, and construction began on 1 September.[15]

The Corps faced the challenge of turning a vast area of corn fields, cotton fields, and timber lands into an airfield. Unexpected groundwater problems called for a special drainage system, but grading was necessary only at the landing area. At first, activity was slow; however, Pearl Harbor brought a new sense of urgency to the project. The first buildings were ready for occupancy in early January 1942. They included administrative offices, barracks, a cafeteria, and a dispensary. The Area Engineer then relocated the Engineer offices to Wellston. Construction progressed so well that the base was activated officially on 1 March 1942, although formal dedication did not take place until April 1943.[16]



*The first hangar under construction in 1941 at Robins Field, (Robins Air Force Base, Office of History)*

Construction at Robins Field and the depot centered around three major projects. The original project, started in September 1941, was the largest and included construction of the landing field and support facilities referred to as the Industrial Area. Three runways were built, each 5,000 feet long, as well as the Operations Building (the Operations, Flight Test, and Transport Squadron Hangar), maintenance hangars for aircraft repair, several other buildings to



*The completed Aircraft Repair Building at Robins Field, (Building 125, Robins Air Force Base) as seen from First Street, 18 June 1943. (Robins Air Force Base, Office of History)*

house additional repair and support services, and various storage buildings. Officers' and Noncommissioned Officers' quarters also were built as were water, sewer, electrical, and steam plant systems. This vast project was finished by August 1942.[17]

The second major project was the Cantonment Area or troop quarters and hospital. Construction began in May 1942 and was completed by August. These buildings were temporary or "mobilization type" structures and thus required little heavy equipment. Their design was somewhat modified from the usual type because of a shortage of lumber. The walls included "gypsum board on the outside of the studding, one layer of waterproof building paper, nailing strips, a second layer of waterproof building paper, and asbestos shingles." The success of the Japanese attack on bases in Hawaii helped determine the layout of the Cantonment Area at Robins Field. The buildings were camouflaged by using a mixture of different-colored shingles on the exterior, and they were not built in lines or close to each other.[18]

The third major construction project began in August 1942 and was completed in April 1943. It included additional buildings in the Industrial and



*The Post Theater, Robins Field, built during World War II. Note the camouflage painting on the sides of the building. (Robins Air Force Base, Office of History)*




*Looking north from First Street across the parking area and landing field at Robins Field, 18 June 1943. (Robins Air Force Base, Office of History)*

Cantonment areas and 100 hardstands, or parking areas, with taxiways for aircraft. Again reflecting the experience of Pearl Harbor, these hardstands were scattered around the airfield rather than concentrated in a single large parking area as originally planned.

The most important aspect of this new work, however, was the building of off-base civilian dormitories for the workers and depot officers and employees.[19] When construction began, the closest housing was 18 miles away in Macon, which could not keep up with the demand. The distance consumed time and precious wartime commodities such as rubber and gasoline. Although the base and depot were built quickly and efficiently, the housing shortage threatened to nullify those successes. In a newspaper interview on 15 June 1941, Colonel Alstaetter had predicted the need for housing at Wellston. Lieutenant Colonel Charles E. Thomas, Jr., the first commander of the depot, wrote the Savannah District Engineer as early as May 1942 that "considerable sums of money have been spent for the overtime payment of employees in order to speed up the activation of this station. It appears now that this expenditure was unwarranted unless suitable housing can be provided in the immediate vicinity."[20]

Consequently, the Engineers acquired land in Wellston and built 15 dormitories to house 2,450 people. The buildings were located approximately three-fourths of a mile from the depot, reflecting once more the experience of Pearl Harbor. The Engineers planned a minimum of 1,000 yards between housing projects and a military facility in the event of enemy attack. This project was finished in late January 1943.[21]

Construction at Robins Field continued during the war years. New buildings were always going up at the airfield or its depot. The Savannah District let contracts in excess of $30 million.[22] The airbase officially was named Robins Field in January 1942 in honor of Brigadier General Augustine Warner Robins, who had been chief of the Air Corps Materiel Division. The name of the depot, however, evolved over many months. The Corps of Engineers first had called the airbase the Georgia Air Depot, while the Air Corps referred to it as Southeast Air Depot. In September 1942 it officially was designated Wellston Army Air Depot, but on 14 October 1942, it was renamed Warner Robins Army Air Depot because the town of Wellston recently had changed its name to Warner Robins.[23]

With the advent of war in December 1941, the Savannah District's airfield construction responsibilities intensified. Bush Field in Augusta, for example, was built to relieve the military traffic at Daniel Field, which had limited expansion potential because of its location in a residential area. The District was given charge of Turner Field at Albany shortly after war was declared, although the base had been built by the Jacksonville District. CAA Fields under Corps authority also required more attention, and as previously noted, some were converted into Army Air Corps fields. This conversion necessitated construction of housing and administration buildings, hangars, maintenance and repair facilities, medical buildings, and support systems including roads and sewer and water lines. Among these were the airfields at Aiken and Anderson, South Carolina, and at Waycross, Statesboro, and Savannah (Chatham Field), Georgia.[24]

The District built additional Army airfields for specialized types of training and as support or satellite fields to other bases. Two examples were Spence Field near Moultrie, Georgia, built as an advanced flight school, and Harris Neck Airfield, a major dive-bomber school. After the government decided to build

an airfield at Harris Neck in north McIntosh County on the Georgia coast, the land was acquired through condemnation suits. The Corps began work in July 1942. Some 100 buildings were constructed including barracks, warehouses, storage facilities, and machine shops, all in the usual temporary military frame style of the day. The Engineers also built a control tower and three 5,000-foot runways set at angles to each other forming a triangle. The hardstands were in the interior of the triangle. The Corps did not build hangars because the area's moderate climate precluded the need.[25]

Although airfield construction was transferred from the Quartermaster Corps to the Corps of Engineers when the nation began military preparedness in 1940, the QMC was still responsible for all other Army projects. In June 1940 the War Department called for the construction of new posts and expansion of existing ones, a mission that was undertaken by the Construction Division of the Quartermaster Corps. Over the next year the QMC was involved in 229 such projects, which proved to be lacking in quality. Senator Harry Truman headed a Senate committee that investigated the situation. The group concluded that the QMC had far exceeded construction estimates and that it lacked planning and construction capabilities needed for effective execution of the projects. Aware of the old rivalry between the two Army branches, the senators handled the situation with diplomacy by saying:

> "By making such criticism the committee does not wish to detract in any way from the very important fact that housing, training, and recreational facilities for 1,216,459 men were provided in the space of a few short months and in most instances were finished and ready for occupancy before the troops arrived. The Construction Division of the Quartermaster Generals' Office supervised the construction of projects which...due to their size and the necessity of speed, presented some of the greatest problems ever encountered by any construction agency in this country and the facilities so provided are better than the troop facilities possessed by any other country."[26]

But the committee went on to note that the Corps of Engineers had been the traditional construction agent for the Army except for the last few decades and recommended that "authority should be granted to the Secretary of War to assign additional construction work to the Corps of Engineers" beyond the current civil works projects.[27]

Major General Edmund B. Gregory, Quartermaster General, defended his group, claiming that they were more in tune with construction needs at Army posts and that the Corps of Engineers was "usually completely aloof from the rest of the Army and entirely out of touch with the day to day life of military organizations."[28] Secretary of War Henry L. Stimson, however, endorsed the transfer of functions. He felt that the Corps of Engineers, with its experience in civil projects, had the planning and organizational expertise needed for the gigantic military tasks ahead.[29] President Roosevelt also favored the move. The War Department requested congressional action on the matter, which came on 1 December 1941, six days before Pearl Harbor. The legislation gave the Corps of Engineers responsibility for all construction, utilities, maintenance and repair, and real estate acquisitions associated with the Army. The actual transfer was to take place 15 days later.[30] This action reflected the philosophy that had guided

the Corps of Engineers from the earliest days: civil works projects had given the Army Engineers the training and experience needed for wartime mobilization. The Corps' two traditional roles were once more fully united.

Throughout the early months of the war, airfield construction and maintenance dominated the Savannah District's attention. There simply were more airfields in the District's area of responsibility than there were Army posts and facilities. The Augusta Arsenal and Quartermaster Depot in Savannah moved under the District's authority as did Old Fort Screven on Tybee Island, where Savannah Engineers had been so involved years earlier. The District also inherited projects, such as Camp Wheeler near Macon, that had been started by the Quartermaster Corps. Although the same general area had been the site of a Camp Wheeler during World War I, the World War II camp was new. The QMC began construction there in 1940, and the camp was operating in the summer of 1941. It would become one of four infantry replacement training centers in the nation.[31] New construction was needed at Camp Wheeler after war was declared, and the Savannah District supervised the contracts for this work.

Camp Gordon near Augusta was another QMC project taken over by the Savannah District in 1942. Initial construction had begun in May 1941. However, when the post was activated in December 1941, most of the buildings were still unfinished, and the camp was only half completed.[32] Corps of Engineers responsibility at Camp Gordon first fell to the Atlanta District. When that District was deactivated after Pearl Harbor, Camp Gordon was transferred to the Savannah District.

The Savannah Engineers worked at a feverish pace to see that the necessary facilities were provided at Camp Gordon. As elsewhere, the District supervised work done by contractors, often following Quartermaster Corps plans. The barracks and other buildings were typical emergency, temporary structures built to meet the immediate needs of a post called on to train infantry and armored divisions. Normally, such buildings were all wood, but because wood was a critical war material, the District authorized the use of clay tile masonry to take advantage of locally produced clay products from Augusta. Some 294 buildings were built using the red tile, giving rise to the name Tile City. Such changes in building materials required altering plans even as construction was under way.[33] The Camp Gordon Station Hospital was among the structures erected. The complex included 139 separate frame buildings connected by covered walkways of similar frame construction.[34]

Another Army installation begun by the QMC but taken over by the Corps of Engineers was Camp Stewart near Hinesville, Georgia. Established as an anti-aircraft artillery training center, this facility was one of those investigated by Truman's Senate committee. Construction began in September 1940, and within six months most of the initial camp construction was completed. The Quartermaster Corps had built hundreds of tent quarters for the soldiers as well as various administrative buildings and a hospital. By February 1941 1,400 troops were stationed at Camp Stewart.[35]

While the housing facilities were adequate at that time, training areas for firing anti-aircraft artillery were lacking. Throughout most of 1941, troops had gone to Amelia Island in Florida (near Fernandina) for training exercises. Thus, when the Corps of Engineers assumed charge of the camp, construction of anti-

aircraft firing ranges, small-arms target ranges, and later anti-tank firing ranges required much of the Engineers' attention. Moreover, in 1942 the Corps constructed additional housing and other post facilities in anticipation of the more than 32,000 troops expected at Camp Stewart in 1943.[36]



*Anti-aircraft firing range at Camp Stewart near Hinesville, Georgia, in 1943. (US Army Photograph)*



*Small arms firing range at Camp Stewart in 1943. (US Army Photograph)*

The Savannah District also took over construction at several smaller Army installations built for infantry training during the war years. Among these was Camp Toccoa in north Georgia, which had been used before the war by the Georgia National Guard. When the camp was activated in July 1942, some 29



*Mess Hall on Hero Road at Camp Stewart in 1942. (US Army Photograph)*



*Enlisted men's hutments at Camp Toccoa, April 1944. These buildings show one type of temporary construction used by the Corps of Engineers during World War II. They had concrete floors, 90-weight composition roofs, and walls of siding insulated with gypsum board covered with tar paper. (Savannah District, Corps of Engineers)*



*The Post Exchange at Camp Toccoa, April 1944. (Savannah District, Corps of Engineers)*

concrete buildings were already in place. The Corps of Engineers built an additional 602 buildings, most of which were enlisted men's hutments and officers' quarters, in addition to the usual support buildings including a post exchange and theater. Most buildings were of temporary construction, with an average life expectancy of three to five years. The Corps also built 10 firing ranges, including machine gun, submachine gun, mortar, and pistol ranges, as well as a small anti-aircraft range. The Savannah District was responsible for $1,329,727 in initial construction at the Camp.[37]

As the war dragged on into 1943, the Savannah District's military responsibilities increased. By that summer the Atlanta Army Service Forces Depot, Atlanta Army Air Base, and Fort McPherson in Atlanta were in the Savannah Engineers' charge. The Corps' responsibility also included converting hospitals to military use. Early in the war a fashionable old hotel in Augusta was transformed into Oliver General Hospital. The District had similar responsibility at Battey General Hospital in Rome, Georgia, and Finney General Hospital in Thomasville, Georgia. Even the Marietta Aircraft Assembly Plant in Marietta, Georgia, and the Volunteer Ordnance Works in Chattanooga, Tennessee, had an Engineer from the Savannah District in charge of construction.[38]

While the Savannah District could handle its new tasks related to military construction, the assignment of airfields, and the transfer of other Army construction, the additional responsibilities presented District personnel with new challenges. Weeks before Pearl Harbor the Southeast Division Engineer wrote to the District Engineer in Savannah acknowledging that "the national defense is occupying most of the time of District personnel" and asserting his belief that the defense efforts would "increase rather than decrease."[39] In early January 1942 Lieutenant Colonel Peter A. Feringa, Acting District Engineer,

remarked, "A vastly increased burden of work has been thrown on the personnel of this (and every other) district during this past year."[40] The additional military work, of course, drained attention and personnel away from civil works projects for which the District was still responsible and sought to carry on within the military preparedness and then wartime environment. Colonel Altstaetter lamented that he could not find enough qualified men to do the engineering studies as yet incomplete in both the Altamaha River Basin and the Savannah River Basin. In October 1941 he reported to the Division Engineer that his "calling for civil service registers and personal correspondence with heads of engineering organizations who might know of suitable men who were available" had been unproductive.[41]

In December 1941 the District Engineer announced the establishment of the Military Construction Division to supervise all military construction not related to airfields. By the following May another reorganization put all construction at airfields, posts, and camps under a new Military Construction Section, a decision made "because of the great increase in work assigned to this District."[42] Major Hue Thomas, Jr., was in charge of this new section. Further restructuring of the Division led to creation of the Posts, Camps and Airfields Division, also under Major Thomas, and the Military Supply, Safety, and Army Air Corps (AA) Airfields sections. Early in the war the District had established an Area Engineer at each of the military projects. However, as the number of projects increased, several were grouped together under regional offices headed by Area Engineers. Project Engineers inspected and supervised contracts at individual installations.

The number of military projects under the Savannah District's control increased as the war continued. The Corps built bombing and gunnery ranges around the state, including the ones at Thomasville, Quitman, and Homerville. The Corps also built a rescue boat center at Thunderbolt, near Savannah, from which rescue operations to save downed pilots at sea were launched. The Corps constructed infantry training camps and additional airfields. Among these were Dublin Airport, Bainbridge Municipal Airfield, Cordele Municipal Airfield, Moultrie Army Airfield, La Grange Municipal Airport, Adel Municipal Airfield, and Brunswick Airfield. Lawson General Hospital in Atlanta joined those medical facilities already under the District's jurisdiction. The Military Supply Section in the District office had plant engineers in such military-related businesses and industries as the LeTourneau Company in Toccoa, which made machinery for the Corps; Steel Products Company of Savannah, which manufactured trailers; and the Price Contracting Company in Swainsboro, which garnished camouflage nets for the Corps. Moreover, the Savannah District's jurisdiction was extended in 1944 to include military projects in Florida, South Carolina, and North Carolina.

At the beginning of the war, the Savannah Engineers' military construction boundaries conformed to the civil works boundaries. As already noted, however, after the Atlanta District was disbanded a number of projects in that area were placed within the Savannah District. Then in 1944, in an effort to operate more efficiently, the Corps reduced the number of Districts involved in military work in the Southeast to three: one to handle Florida, one the Gulf Coast region, and one the South Atlantic area. To be sure, the level of military work

was declining by that time. As early as November 1943 the South Atlantic Division noted the "substantial completion of the war-construction program."[43] Military construction in Georgia and the rest of the South Atlantic region was assigned to the Charleston District. This action left both the Savannah and Wilmington Districts with only limited civil work. Evaluating the situation, one Savannah District employee later wrote,

> "During the World War II emergency as a Corps of Engineers District, Savannah had demonstrated its ability to organize and go into rapid action in providing support facilities for troops. It had justified its continued existence by its rapid and economical construction work. The District employees were a well-coordinated, hard-working group who had amply demonstrated their ability and believed that the District should be left to operate its own territory, and that what was best for the Savannah District was best for the Corps."[44]

Prepared to turn the Georgia military work over to Charleston but armed with facts and figures attesting to the Savannah District's superior performance, Lieutenant Colonel Thomas, now District Engineer, appeared before the South Atlantic Division officers to plead the District's case. The Division Engineer relayed Thomas's arguments to the Chief of Engineers, Lieutenant General Eugene Reybold, who subsequently reversed the earlier decision. Rather than losing its own military work, the Savannah District "came home with the military work for Florida, Georgia, South and North Carolina, and a part of Tennessee."[45]

The military responsibilities of the Wilmington District were transferred to Savannah in May 1944; those of the Charleston District soon followed. Military construction in Florida was turned over by the Jacksonville District in October of that year, and that in middle Tennessee, formerly under the Nashville and Kingsport Districts, also was added. The military installations transferred to the Savannah District included such major airfields as Shaw, Spartanburg, Charleston, Myrtle Beach, Walterboro, and Congaree in South Carolina; Seymour-Johnson, Wilmington, Pope, and Bluethenthal in North Carolina; and MacDill, Pine Castle, Homestead, and Orlando in Florida. Major Army installations such as Fort Jackson, South Carolina; Fort Bragg, North Carolina; and Camp Blanding near Jacksonville, Florida, also were included. The Corps assumed responsibility for a host of smaller airfields and posts throughout the three states as well. Hospitals, bombing ranges, rifle ranges, Quartermaster depots, and even recreation areas swelled the Savannah District's responsibilities. In Tennessee the East Tennessee Ordnance Works at Copper Hill and the Holston Ordnance Works in Kingsport presented new concerns as did additional military supply companies such as the Firestone Tire and Rubber Company in Winston-Salem, North Carolina. Disposal of surplus facilities was another Corps task.

As before, the military installations were organized under Resident Engineers, formerly called Area Engineers. Plant Engineers carried out the Corps' responsibilities at manufacturing establishments, and caretakers working for the Savannah District looked after surplus facilities in all four states. Table I shows the vast extent of the Savannah District's military responsibilities before the end of World War II.

**TABLE I**
**FIELD OFFICES**
**SAVANNAH ENGINEER DISTRICT**
**1944***

**MILITARY CONSTRUCTION**

| **Resident Office** | **Projects Under Resident Office Jurisdiction** |
|---|---|
| Resident Engineer<br>Augusta, GA | Augusta Arsenal, Augusta GA<br>Camp Gordon, Augusta, GA<br>Daniel Field, Augusta, GA<br>Oliver General Hospital, Augusta, GA<br>Bush Field, Augusta, GA<br>Aiken Airfield, Aiken, SC<br>Coronaca Airfield, Greenwood, SC<br>Anderson Municipal Airport, Anderson, SC<br>Barnwell Municipal Airport, Barnwell, SC<br>Columbia Army Air Base, Columbia, SC<br>Congaree Army Airfield, Congaree, SC<br>North Municipal Airport, North, SC<br>Shaw Field, Sumter, SC<br>Lake Murray Bombing Range, Columbia, SC<br>Orangeburg Flying School, Orangeburg, SC<br>QM Market Center, Columbia, SC<br>Greenville Army Air Base, Greenville, SC<br>Greenville Municipal Airfield, Greenville, SC<br>Greenville Rifle Range, Greenville, SC<br>Union Bombing Range, Union, SC<br>Chester Army Airfield, Chester, SC<br>Sartanburg Municipal Airport, Spartanburg, SC<br>Camp Croft, SC<br>Camden Flying School, Camden, SC<br>Fort Jackson, SC<br>Pontiac Bombing Range, Pontiac, SC<br>Moore General Hospital, Swannanoa, NC<br>Lake Lure Rest Center, Lake Lure, NC<br>Asheville-Hendersonville Airport, Asheville, NC |
| Resident Engineer<br>Macon, GA | Robins Field, Macon, GA<br>Cochran Field, Macon, GA<br>Camp Wheeler, Macon, GA<br>Herbert Smart Airfield, Macon, GA<br>Vidalia Army Airfield, Vidalia, GA<br>Dublin Municipal Airport, Dublin, GA<br>Finney General Hospital, Thomasville, GA |

*Adapted from District Circular No. 198, 4 Dec. 1944, FARC-EP, RG 77, Acc. No. 4KRA-83-05, Box 1-B/53/12/C/1, District Circulars, 1933-1953.

| | |
|---|---|
| | Thomasville Army Airfield, Thomasville, GA<br>Thomasville Rifle Range, Thomasville, GA<br>Thomasville Bombing and Gunnery Range, Quitman, GA<br>Spence Field, Moultrie, GA<br>Moultrie Municipal Airport, Moultrie, GA<br>Tifton Army Airfield, Tifton, GA<br>Turner Field and Auxiliary Fields, Albany, GA<br>Albany Municipal Airport, Albany, GA<br>Bainbridge Municipal Airport, Bainbridge, GA<br>Americus Municipal Airfield, Americus, GA<br>Homerville Bombing Range, Homerville, GA<br>Douglas Municipal Airport, Douglas, GA<br>Adel Municipal Airfield, Adel, GA<br>Moody Field, Valdosta, GA<br>Valdosta Municipal Airport, Valdosta, GA<br>Cordele Municipal Airport, Cordele, GA<br>Bainbridge Army Airfield, Bainbridge, GA<br>Perry Army Airfield, Perry, FL |
| Resident Engineer<br>Savannah, GA | Chatham Field, Savannah, GA<br>Hunter Field, Savannah, GA<br>Savannah ASF Depot, Savannah, GA<br>Thunderbolt Yacht Basin, Savannah, GA<br>Camp Stewart, Hinesville, GA<br>Liberty Field, Hinesville, GA<br>Harris Neck Army Airfield, Harris Neck, GA<br>Waycross Army Airfield, Waycross, GA<br>Statesboro Army Airfield, Statesboro, GA<br>Sylvania Army Airport, Sylvania, GA<br>Brunswick Airfield, Brunswick, GA<br>Jacksonville Army Airfield, Jacksonville, FL<br>Camp Blanding, FL |
| Resident Engineer<br>Marietta, GA | Atlanta Ordnance Depot, Atlanta, GA<br>Atlanta ASF Depot, Atlanta, GA<br>Lawson General Hospital, Atlanta, GA<br>Fort McPherson, Atlanta, GA<br>Atlanta Army Air Base, Atlanta, GA<br>Washington Park Recreation Area, Atlanta, GA<br>Marietta Aircraft Assembly Plant, Marietta, GA<br>Marietta Army Airfield, Marietta, GA<br>La Grange Municipal Airport, La Grange, GA<br>Battey General Hospital, Rome, GA<br>Fort Oglethorpe, GA<br>Crossville Internment Camp, Crossville, TN |

| | |
|---|---|
| Resident Engineer<br>Fort Bragg, NC | Fort Bragg, NC<br>Pope Field, Fort Bragg, NC<br>Knollwood Field, Southern Pines, NC<br>Camp MacKall, NC<br>Bluethenthal Field, Wilmington, NC<br>WAC Station, Wilmington, NC<br>Camp Davis, NC<br>Camp Davis Army Airfield, Camp Davis, NC<br>Smith Reynolds Airport, Winston-Salem, NC<br>Greensboro-High Point Airport, Greensboro, NC<br>Overseas AAF Replacement Depot, Greensboro, NC<br>Raleigh-Durham Army Airfield, Raleigh, NC<br>Raleigh State College, Raleigh, NC<br>Camp Butner, NC<br>Seymour-Johnson Field, Goldsboro, NC<br>Laurinburg-Maxton Army Air Base, Maxton, NC<br>Beaufort Airfield, Beaufort, NC<br>Camp Sutton, Monroe, NC<br>QM Depot, Charlotte, NC<br>Morris Field, Charlotte, NC<br>Pageland Rifle Range, Pageland, NC |
| Resident Engineer<br>North Charleston, | *QM Depot, Charlotte, NC<br>*Morris Field, Charlotte, NC<br>SC Florence Army Airfield, Florence, SC<br>Hartsville Army Airfield, Hartsville, SC<br>Sand Hill Bombing Range, McBee, SC<br>Bennettsville Flying School, Bennettsville, SC<br>Myrtle Beach Army Airfield, Myrtle Beach, SC<br>Myrtle Beach Bombing Range, Myrtle Beach, SC<br>Ocean Drive Flight Strip, Ocean Drive, SC<br>Johns Island Army Airfield, Johns Island, SC<br>Specialized Depot, Moncks Corner, SC<br>Walterboro Army Airfield, Walterboro, SC<br>Walterboro Bombing Range, Walterboro, SC<br>Walterboro Rifle Range, Walterboro, SC<br>Wampee Flight Strip, Wampee, SC<br>Charleston Army Airfield, Charleston, SC<br>Port of Embarkation, Charleston, SC<br>Charleston Rifle Range, Charleston, SC<br>Charleston Recreational Area, Charleston, SC<br>Fort Moultrie, Charleston, SC<br>Charleston Harbor Defense, Charleston, SC<br>Stark General Hospital, Charleston, SC<br>Stoney Field, Charleston, SC |

*To complete present construction.

| | |
|---|---|
| Resident Engineer<br>Chattanooga, TN | Volunteer Ordnance Works, Chattanooga, TN<br>E. Tennessee Ordnance Works, Copperhill, TN<br>Holston Ordnance Works, Kingsport, TN |
| Resident Engineer<br>Tampa, FL | Alachua Army Airfield, Gainesville, FL<br>Avon Park Bombing Range, Avon Park, FL<br>Buckingham Army Airfield, Fort Myers, FL<br>Drew Field, Tampa, FL<br>MacDill Field, Tampa, FL<br>Kissimmee Army Airfield, Kissimmee, FL<br>Don-Ce-Sar Hospital, St. Petersburg, FL<br>Orlando Army Air Base, Orlando, FL<br>Pine Castle Army Airfield, Pine Castle, FL<br>Venice Army Airfield, Venice, FL<br>Daytona Beach Hospital, Daytona Beach, FL |
| Resident Engineer<br>Miami Beach, FL | Boca Raton Army Airfield, Boca Raton, FL<br>Coral Gables, FL<br>Homestead Army Airfield, Homestead, FL<br>Miami Beach Redistribution Center, Miami Beach, FL<br>36th Street Airport, Miami, FL<br>Morrison Field, West Palm Beach, FL |
| Resident Engineer<br>West Palm Beach, FL | Boca Raton Club, Boca Raton, FL<br>(Restoration only) |
| District Testing Laboratory<br>Jacksonville, FL | |
| Warner Robins U.S. Engineer Warehouse<br>Macon, GA | |

**MILITARY SUPPLY**

| | |
|---|---|
| Savannah Procurement Area Office<br>U.S. Engineer Office<br>Savannah, GA | Plant Engineer<br>R.G. LeTourneau Co., Inc.<br>Toccoa, GA<br><br>Plant Engineer<br>Steel Products Co., Inc.<br>Savannah, GA |
| Charlotte Procurement Area Office<br>U.S. Engineer Office<br>Charlotte, NC | Plant Engineer<br>Firestone Tire and Rubber Co.<br>Winston-Salem, NC |

Raleigh Procurement Area Office
U.S. Engineer Office
Raleigh, NC

U.S. Engineer Office
N. Charleston Engineer Lumber Warehouse
N. Charleston, SC

**SURPLUS FACILITIES INSTALLATIONS**

Brunswick Recreational Area
Brunswick, GA

Carolina Beach Recreational Area
Carolina Beach, NC

State Park Recreational Area
Myrtle Beach, SC

Camp Virginia Dare
Manteo, NC

Camp Bell Haven, FL

Camp Murphy
Camp Murphy, FL

Temporary Harbor Defense
Pass-A-Grille, FL

Sears Landing, NC

Stoney Field
Charleston, SC

Camp Branch
Morehead City, NC

Fort Screven
Fort Screven, GA

Fort Fisher
Fort Fisher, NC

Camp Weatherford
Bradenton, FL

Atlantic Beach Camp
Atlantic Beach, FL

U.S. Army Singapore
Sadie Club, FL

Gotha Ordnance Depot
Gotha, FL

The following installations have no personnel at site:

Cape Canaveral, FL
Fishers Island, FL
Flagler Beach, FL
Lemon Bay, FL
Mayport, FL
Davenport, FL
Childs, FL
Myakka City, FL
Bowling Green, FL
Avon Park, FL
Parrish, FL
Fort Macon,
Morehead City, NC

A.W.S. Site #23
A.W.S. Site #25
A.W.S. Site #22
A.W.U.T.C. Site #7
A.W.S. Site #21
A.W.U.T.C. Site #3
A.W.U.T.C. Site #5
A.W.S. Site #6

A.W.U.T.C. Site #4
A.W.S. Site #4

The District's military activities were not limited to bases and other types of military installations, however. They included other types of defense work as well. For example, after German submarines patrolling off the Georgia coast torpedoed several merchant ships, the Corps built and maintained anti-submarine observation towers along the coastal islands. The District also supported the war effort in Europe, for the War Department called on the Engineers to test methods of destroying dams held by German forces in Scandinavia. Specifically, the Army wanted to know if the dams could be destroyed by exploding bombs near the dam's intakes. The District experimented by using several small mill dams and concluded that this tactic would be ineffective in the Scandinavian situation.[46] In February 1945 the District responded to the need to transport troops across the Rhine River. The Army called for 600 small plywood boats, and within a day the Savannah District had contracts with four Florida boat companies. Several Florida towns roped off streets to provide work space, and the task was completed in nine working days.[47]

After a peak year in 1943, military construction started winding down for the Savannah District in 1944. The end of the war in Europe in May 1945 brought further cutbacks, and Japan's surrender on 2 September signaled an end to the crisis. The Corps of Engineers and the Savannah District now focused on demobilization.

Brigadier General Raymond F. Fowler, Division Engineer for the South Atlantic Division, announced at a meeting held in Savannah in June 1945 that the new fiscal year would see a major decline in military construction. Later he complimented the Savannah District for a job well done during the war, noting that the District had been responsible for $1 billion in military construction, obviously the lion's share of the $1,767,852,837 in construction carried out by the entire South Atlantic Division. Moreover, the Savannah Engineers had completed this enormous task with one of the lowest overhead costs in the Division.[48]

As the nation's thoughts turned to peace, District employees likewise became concerned with job security. In August the District reduced the workweek from 48 to 44 hours, and Army officers working with the District faced reassignment.[49] Major Alvin M. Koplin, District Executive Officer, was keenly aware of the situation when he wrote following V-J Day, "As our responsibility during the past several years has increased by leaps and bounds in an effort to keep abreast of the tremendous military building and procurement program, naturally the number of persons required to accomplish this undertaking has also increased." He then acknowledged that the future workload of the District was "of definite interest" to its employees and staff. In predicting the inevitable cutbacks and District reorganization, Koplin was optimistic that transfers and reassignments within the new organizational structure would preserve as many jobs as possible.[50]

Actually, changes in organization had taken place before the war's end, and numerous changes would be made in the years following the war in order to adapt the District to its postwar role. For example, in July 1945 the Military Construction and Readjustment Division was abolished and a new Military Engineering Division was created. Also, an Operations Division was set up to include both military and civil works operations.[51] In mid-October the Military

Supply Division was abolished and its duties absorbed by other parts of the District organization.[52] The following January an Engineering Division was established, which included Military Engineering, Civil Works Engineering, and Clark Hill Project branches. The Operations Division was renamed the Construction Division, and included the former Civil Works Branch, now renamed the Operations Branch.[53] The District was reorganized repeatedly in the late 1940s. Clearly, after 1945 its military responsibilities paled in comparison with civil works, and the military work was gradually reintegrated into the civil works operations.

During these years the military construction boundaries of the Savannah District changed somewhat from their definition in 1945. Most of Florida and all of South Carolina remained under Savannah's jurisdiction. The District retained all of Georgia except for Fort Benning and Lawson Field near Columbus, which continued under the Mobile District. For a few years the Savannah District lost the projects in the Atlanta area to Mobile, but in April 1948 these installations were returned to Savannah. Fort Bragg in North Carolina was reassigned to the Wilmington District in the summer of 1946, but the rest of that state remained part of the Savannah District. One further loss was the eastern part of Tennessee, which was transferred to the Mobile District except for Chattanooga National Cemetery.[54] This retention of a large geographical area under the Savannah District was due to the decline in military activities for the Corps of Engineers after the war; a single District could more efficiently handle the limited military work of one large area than could several Districts that were preoccupied once more with civil projects.[55]

Peacetime brought an immediate halt to contracts not yet started. In late summer of 1945, a $3 million project to construct runways at Chatham Field in Savannah to support B-29s was canceled, as was a $4.2 million project at MacDill Airfield in Tampa. Other existing contracts had to be canceled as well, and the District held a two-day conference that same summer to instruct accountants in how to terminate war contracts between the Corps and military suppliers. By September 1947 the District had terminated 124 military construction and supply contracts amounting to nearly $2 million.[56]

One of the District's major postwar concerns was disposal of surplus property such as buildings, equipment, supplies, and even land. Although some installations were on government-owned property, others were on leased land. These leases had to be canceled and the buildings disposed of. The Corps of Engineers was responsible for disposing of all excess real estate for the Army even if the land and its facilities had not been under the Corps' direct jurisdiction during the war. Originally, the Real Estate Division in the South Atlantic Division Office handled these duties. In 1947 a Real Estate Division was created in the District, and these responsibilities were transferred to it in 1950.[57]

The Savannah District eventually disposed of 465 installations in five states — ranging from Key West, Florida, to Monroe, North Carolina.[58] Hunter Airfield, for example, was returned to the city of Savannah in June 1946.[59] Savannah Beach acquired Fort Screven when it was declared surplus. Buildings at Camp Wheeler were sold to the highest bidder in August and September 1946. The structures there were sold complete with installed equipment and then disassembled and moved to their new locations.[60] Camps Blanding, Butler,

and Murphy were declared surplus as were many airfields. Some facilities were turned over to the War Assets Administration for disposal because upkeep of unused installations was expensive. These included Tifton Army Airfield, Statesboro Airfield, and Harris Neck Airfield. The disposal of Harris Neck left long-term resentments that surfaced in 1979 when black families sued to have the land returned to them.[61] In 1948 the Savannah Quartermaster Depot, also known as the Army Service Force Depot, was sold to the state of Georgia to be developed by the Georgia Ports Authority into a new shipping terminal. The sale involved 709 buildings and 400 acres of land. Approximately 16,000 railroad cars a month had been processed through this depot during the war.[62]

An important activity associated with facilities disposal was dedudding, or the defusing and disposal of unexploded shells and bombs. This task took a significant amount of the District's time. Before leased land could be returned to its owners or government-owned land could be given over to other activities, a bomb and shell disposal team assigned to the District searched the land. First, the entire area was burned over to better expose the shells. Then the dedudders walked over the area collecting scrap and detonating and destroying in place live



*Some of the results of dedudding activities of the Corps of Engineers at Camp Croft, South Carolina, in the years following World War II.* (Engineer Officers Advanced Class, 1952, *p. 126)*

shells, bombs, rockets, grenades, etc. Wherever possible, mine detectors were used to help find burned duds. The Savannah Engineers reported that in the years following World War II, District disposal teams dedudded more than 500,000 acres of land varying from 200 to 70,000 acres in area. On one range 6,000 high-explosive missiles were disposed of and more than 500 tons of scrap were collected.[63]

Most of the smaller military installations under the Savannah District were

dismantled after the war. However, some, such as Camp Stewart, merely were deactivated and left under the Corps' supervision. The government also designated some Army posts and airfields for permanent use, and in the late 1940s the District was responsible for new construction at these sites. The Adjutant General declared that the lack of family housing on military bases was one of the most "serious problems now facing the country."[64] To help handle the initial housing shortage for soldiers and their families, the District converted barracks to family quarters at ten Army installations and airfields including Fort Bragg, Fort Jackson, and MacDill Field. Later, new family housing was built at Fort McPherson in Atlanta and at MacDill, which had become an Air Force base after the Air Force's separation from the Army in 1947. The Savannah District also extended the runway at Marietta Air Force Base, later renamed Dobbins Air Force Base, and designed two new control towers for MacDill and Dobbins. More than 100 buildings were rehabilitated at Camp Gordon for use as an annex to Oliver General Hospital.[65]

Construction of armories for the Organized Reserve Corps, the National Guard, and Air National Guard also gave the District experience in military construction in the postwar years. This work was done in all four states within the Savannah District's military boundaries. Moreover, the Savannah Engineers designed and constructed new facilities at national cemeteries. The District was responsible for plans and specifications and, in some cases, actual construction. Between 1947 and 1950 the District developed the New Bern and Raleigh National Cemeteries in North Carolina, the Florence and Beaufort National Cemeteries in South Carolina, and the Chattanooga National Cemetery in Tennessee. These projects included remodeling utility buildings, grading and paving roadways, and even planting grass. The District also did design and economic survey reports on proposed additions to veterans hospitals in Columbia, South Carolina, and Atlanta, Georgia.[66]

During this period, the Savannah District's actual construction work was limited. The Military Construction Branch had approximately 15 employees: 5 civilian employees in Savannah, 2 Area Engineers in the field, an inspector assigned to each contract, and some clerical help.[67] The experience gained in small projects, however, aided the District when it was called on again to mobilize for the Korean War in 1950.[68] As land and property were returned to owners after the war, the Corps of Engineers also became involved in litigation and settlement of claims. The War Department had leased much of the land used in the camps and airfields during the war. After the war various people and companies filed claims against the government citing damages to their property in excess of the terms of the lease agreements. In 1947 the Real Estate Division of the Savannah District became responsible for handling claims. Some claims could be settled out of court; others resulted in lawsuits that dragged on for years.

One such suit related to a lease for land incorporated into Camp Wheeler. Mrs. Velma G. Turner leased approximately 275 acres to Macon. The city in turn leased the land to the U.S. government in 1940 with the understanding that the land would be returned to the owner in its original condition. When the land was returned to Mrs. Turner in 1947, it had concrete foundations and floors left on it, hundreds of feet of underground sewage pipe reportedly still filled with



*Timber harvesting at Fort Bragg done under the supervision of the Real Estate Division of the Savannah District.* (Engineer Officers Advanced Class, 1960)

sewage, foxholes and dugouts that had not been filled in, and a borrow pit from which 500,000 cubic yards of sand had been taken. Moreover, two buildings originally on the property had been torn down. Mrs. Turner sued for $15,000, and in 1950 the court awarded her $17,500 for damages.[69]

One of the more positive aspects of the District's military role in the late 1940s and later was the program of timber harvesting on various military installations including Camp Stewart, Camp Gordon, Fort Jackson, and the Charleston Transportation Corps Depot. The thousands of acres of land under Army contract and administered by the District Real Estate Branch often had vast stands of pine and hardwood forests that the District was able to turn into a profit-making commodity. Two types of contracts were used for timber harvesting. One type permitted timber companies to cut the trees and manufacture lumber, which was then reserved for use by the Army or some other government agency. The other type involved the sale of the trees to companies for use as lumber, pulpwood, or poles. The program's statistics collected by the District in part reflected its success. For example, between 1947 and 1952, timber valued at $292,711.07 was harvested at the Charleston Transportation Corps Depot under Savannah District supervision.[70] Such timber harvesting could be devastating to sawblades because of shrapnel and other metal pieces embedded in the trees during training exercises, and the Savannah District reportedly pioneered the use of mine detectors to locate shell fragments.[71]

# 12 THE MILITARY ROLE — 1950 TO 1984

## THE KOREAN WAR ERA

On 25 June 1950 the forces of Communist North Korea crossed the 38th Parallel and invaded South Korea. The United States was surprised by this act of aggression and ill prepared for the following military course of action. President Harry Truman immediately ordered American air and naval forces to South Korea. Furthermore, following adoption of a United Nations Security Council resolution urging all U.N. members to join in the defense of South Korea, the President sent American ground troops into the conflict as well. The Korean War was on. That December Truman declared a national emergency, which authorized funding for increased military construction.

While the United States had not demobilized after World War II to the extent typical of other postwar periods, the nation did not have the forces and facilities needed for the level of war represented by the conflict. As already noted, the late 1940s had seen the disposal of surplus installations, deactivation of others, and a cutback at permanent bases and camps. The nation faced a new emergency; one requiring rapid mobilization. The Corps of Engineers, still in charge of construction for both the Army and the Air Force, faced the challenge of restoring old facilities and building new ones.

According to the executive officer of the Savannah District, the office was unprepared for the mobilization. One observer had commented that as of 1949, "the military construction of this [Savannah] District is very limited and the jobs that have been assigned are very small." As late as October 1949, the District had recommended that since little military work was foreseen for the future the Military and Civil Works branches should be merged. Military engineering was described as "almost an unnecessary function of the Corps of Engineers," and only five people in the District were involved in military construction by the summer of 1950. The executive officer summarized the situation: "Before Korea it was a struggle, due to lack of work, to keep the semblance of a civilian organization capable of designing and handling military construction." In addition, under guidelines of the nationally mandated Records Retirement Program after World War II, the District had disposed of unneeded correspondence and obsolete plans and specifications. Such documents from the previous war could have provided useful information and

guidelines for construction during the Korean War. However, the District "had depleted . . . files of considerable information which would have been retained if the Korean emergency had been anticipated."[1]

A limitation on personnel was one of the more serious problems at the beginning of mobilization. The District executive officer remarked, "On June 25, 1950, the Military Group had no expectation of any increase in military budgeting and so were completely unprepared from the standpoint of personnel planning for the Korean emergency."[2] Shortages of skilled professionals were especially acute. The Civil Service registers for the Savannah District soon were depleted of engineers, draftsmen, and inspectors, and the District had to look elsewhere for people to fill war-related jobs. When the war began, 691 people worked out of the Savannah District office. Of these, 589 were paid from civil funds and 102 were paid from military funds. As of 7 September 1951 the total number of employees had risen to 707, with 387 paid from civil funds and 320 from military funds. Although the total staff of the District was not increasing that much, many people were being transferred from civil works to military-related jobs. One observer described how the District handled its workload at the time:

> "First, technical men from all branches of the office left their routine work to aid the Engineering Division in finding out what had to be done and then helped draw up plans and specifications to perform the work. After contracts were hastily let another reshuffling of technical personnel was required to staff the inspection force. There again men were shifted from their normal work to the urgent military construction program.... The fact that we had men on civil work who were qualified to handle military construction, and that they could be transferred to it, permitted orderly construction placement with minimum delay and at least minimum forces of qualified inspectors."[3]

The new demands affected not only those in engineering and construction; the Real Estate Division experienced similar changes. Its staff increased from 19 to 61 during the same period, and 29 of the 32 new employees were involved in land acquisition. War needs called for land in order to expand existing installations or build new ones, as well as new leases for recruiting and Organized Reserve Corps (ORC) facilities.[4]

The fluctuation in personnel strength can be explained in part by the changes in the Savannah District's military boundaries after the start of the Korean War. In the years following World War II, military construction was concentrated for economic reasons under the direction of a few Districts such as Savannah. The Korean War, with its new construction requirements, reversed that situation. On 18 August 1950 the Savannah District transferred military responsibility for the rest of North Carolina to the Wilmington District and that for Florida east of St. Marks River to the Jacksonville District. South Carolina and Georgia, except Fort Benning and Lawson Air Force Base, remained under the Savannah District. In December the boundaries were changed again, giving the Charleston District all of South Carolina, except Fort Jackson, and transferring Tennessee east of the 87th Meridian to Savannah. The two exceptions were the Holston Ordnance Works and Cambria Range, which were left under the Mobile District. Further changes came on 1 April 1951 when Fort Benning and

Lawson Air Force Base were given to Savannah; on 15 May 1951 when eastern Tennessee was transferred to the Nashville District; and on 1 July 1951 when Fort Jackson was given to the Charleston District. By 1952 the Savannah District's military boundaries encompassed only the state of Georgia.[5] Table II lists the Army and Air Force facilities for which the Savannah District had military construction responsibilities as of 1951.

**TABLE II**

**MILITARY CONSTRUCTION**
**SAVANNAH DISTRICT, 1951***

| Army | Air Force |
|---|---|
| Atlanta General Depot | Dobbins |
| Fort Benning | Hunter |
| Fort McPherson | Lawson |
| Camp Gordon | Moody |
| Camp Stewart | Robins |
| Augusta Arsenal | Turner |
| Cemeteries | Comer |
| Armories | Daniel |

**Engineer Officers Advanced Class, 1952,* p. 82.

The first task facing the District in preparing for the war was to rehabilitate Fort Jackson, Camp Gordon, and Camp Stewart. Most of the buildings at these three installations were temporary wooden structures left from the last war. Fort Jackson had never been deactivated after 1945, but the intervening years had taken their toll on the facilities there. Camp Gordon had been virtually deserted in 1946 and 1947 but was reactivated in 1948 as a Signal Training Center and, a few weeks later, the Military Police School. However, these two programs hardly prepared the camp for the needs of war. Camp Stewart also had been deactivated at the end of World War II. A skeleton crew of 2 officers, 10 enlisted men, and approximately 50 civilians had maintained the place, which was used for National Guard summer encampments. It had fallen into disrepair by August 1950, when it was reopened as an anti-aircraft artillery training center.[6]

People from various branches of the Savannah District helped the Engineering Division get work started. Within a few days after the outbreak of war, estimates had been prepared for more than 3,000 buildings of various types as well as for paving projects and support utility systems. Contracts followed over the next several weeks. Work was done on barracks and hospitals, water tanks, sewage disposal plants, fire-alarm systems, utilities, railroad tracks, and roads. The anticipated troop buildup required additional housing facilities, and the Corps supervised the construction of hundreds of concrete floors and wooden tent frames reminiscent of World War II days. The first contracts for Camp Gordon were let on 21 August 1950 for the rehabilitation of 30 buildings. A total of 22,000 men were expected there, and the work was completed by 1

November. Contracts awarded for Camp Stewart on 30 August were completed in February 1951. The first contracts for Fort Jackson were awarded in September 1950 and completed the following February. At the same time, some 20,000 men moved into Fort Jackson.[7]

The transfer to the Savannah District of Fort Benning and the adjacent Lawson Air Force Base brought an extraordinary challenge. Much of the construction planned earlier for Lawson had not been done because of disputes between the Army and Air Force over which had charge of the facility. At the time of the Korean conflict, the most pressing need there was to extend the runways and taxiways and to install navigational aids and modern airfield lighting. The old control tower also required modernizing. Some $521,000 was allotted for project construction at Lawson in 1951, and the Savannah District supervised all phases of the work. Projects at Fort Benning included constructing more than 35 new permanent structures such as barracks, mess halls, recreation facilities, and a 500-bed hospital.[8]

Rehabilitation of existing facilities and new construction extended to other Air Force bases as well. For example, the old Hunter Field, which had served as Savannah's municipal airport since it was returned to the city several years earlier, was restored to the Air Force in September 1950. In the late 1940s the Air Force had used Chatham Field, retained after World War II, as a military base but found that its facilities were extremely limited. Hence, the city traded Hunter Field and 3,500 additional acres to the Air Force for one dollar in exchange for Chatham Field, which subsequently became the community's airport (under its former name of Travis Field). Hunter Air Force Base then became a Strategic Air Command Base.[9] The District subsequently undertook construction of permanent airmen's dormitories and other buildings as well as extensive runway additions.

Turner Air Force Base at Albany was another focus of District activity as some $1.7 million was earmarked for construction there.[10] A new administration building and air control tower were among the projects. The District reactivated Moody Air Force Base at Valdosta, originally built by the Jacksonville District and decommissioned after World War II, setting up emergency headquarters in a local hotel and drawing up plans and awarding contracts with remarkable speed.[11] Perhaps the biggest District job for the Air Force, however, was at Robins Air Force Base. Congress in March 1951 appropriated $3.5 million for large-scale construction there, which included expanding the aircraft parking apron at a cost of approximately $1 million. New buildings would include a hazardous test building, a vehicle repair building, a communications building, two warehouses, and additions to the engine repair building.[12]

As previously noted, all the military work of the District was done by contract. The Corps was responsible for design (which could be contracted to architect-engineer firms or done by District personnel), awarding of contracts, supervision of work, and inspections. The Construction Division in the District office oversaw the entire process. However, the District was subdivided into territorial units supervised by Area Engineers under whom two or more installations were grouped, each major installation having a Project Engineer. This organizational structure was typical of that followed in World War II and would change little in years to come, although area offices would be moved from time

to time and projects regrouped under them as conditions and responsibilities changed.[11] Tables III and IV show assignments by Area Engineer offices as of 1952 and 1955.



*Front entrance of new 225-man barracks built at Fort Benning during the Korean Conflict. 6 July 1954. (Savannah District, Corps of Engineers)*



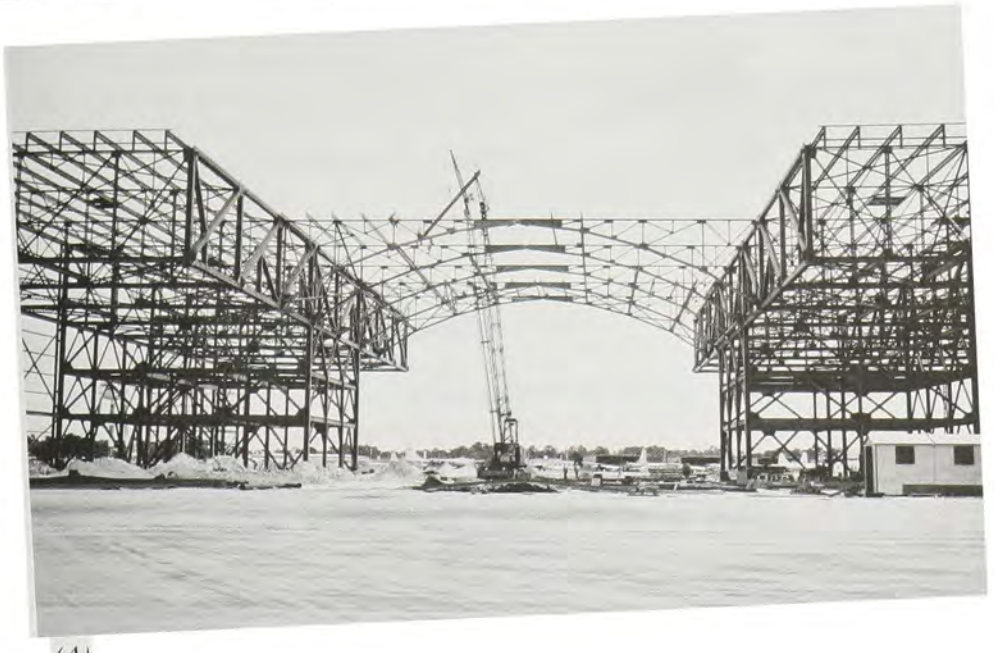

*Contractor's sign at construction site of new Airmen's Dormitories at Hunter Air Force Base, 1953. (Savannah District, Corps of Engineers)*



*Construction of Airmen's Dormitories, Hunter Air Force Base, 20 May 1953. (Savannah District, Corps of Engineers)*



*Control Tower at Hunter Air Force Base in Savannah: (A) under construction, 27 November 1953, and (B) nearing completion, 14 May 1954. (Savannah District, Corps of Engineers)*



(A)



(B)

*Hanger construction at Hunter Air Force Base: (A) steel framework construction, 8 August 1953, and (B) placing siding and paving operations, 5 February 1954. (Savannah District, Corps of Engineers)*

**TABLE III**

**SAVANNAH DISTRICT**
**AREA ENGINEER OFFICES, 1952***

| | |
|---|---|
| Savannah Area Engineer: | Hunter Air Force Base Project Engineer |
| | Camp Stewart Project Engineer |
| Augusta Area Engineer: | Camp Gordon Project Engineer |
| | Comer Air Warning Service |
| | Daniel Field |
| Atlanta Area Engineer: | Atlanta General Depot Project Engineer |
| | Dobbins Air Force Base Project Engineer |
| | Fort Benning Project Engineer |
| | Lawson Air Force Base Project Engineer |
| Valdosta Area Engineer: | Moody Air Force Base Project Engineer |
| | Turner Air Force Base Project Engineer |
| | Robins Air Force Base Project Engineer |

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**TABLE IV**

**SAVANNAH DISTRICT**
**AREA ENGINEER OFFICES, 1955***

| | |
|---|---|
| Atlanta: | Dobbins Air Force Base |
| | Fort McPherson |
| | Atlanta General Depot |
| | Fort Benning |
| | Lawson Air Force Base |
| Macon: | Robins Air Force Base |
| | Moody Air Force Base |
| | Turner Air Force Base |
| Savannah: | Hunter Air Force Base |
| | Camp Stewart |
| | Camp Gordon |
| | Kings Bay |

*"Department of Army Program No. 13 — Construction; Sub Program — Savannah District; South Atlantic Division, 1 Sept. 1954," FARC-EP, RG 77, Acc. No. 77A2093, Box 294, file 310.1, Office Administration and Organization.

Although the Savannah District's boundaries for military construction narrowed during the Korean War, the District continued to be responsible for real estate matters concerning military and war needs in Georgia, South Carolina, and North Carolina. To facilitate operations in the latter two states, in December 1950 the District organized a Real Estate Division in both the Charleston and Wilmington Districts. It was presumed that "in the event of further mobilization or an increased construction program these offices will be the nucleus for Real Estate Division in each District."[14]

One of the tasks of the Real Estate Division was to inspect Army and Air Force installations as well as Organized Reserve Corps armories to determine the extent and efficiency of space utilization. These inspections were important not only at the beginning of the war when the military sought to identify its immediate needs, but also in the later months when they met a twofold purpose: (1) "to forestall the acquisition of more space than past utilization experience proves to be necessary" and (2) "to cure inefficient utilization of space already acquired."[15] This was especially true at ORC facilities. A report following one inspection concluded that of all the ORC installations in Georgia, South Carolina, and North Carolina, only two used more than 50 percent of their space during 1952.[16]

Land acquisition for expanding existing bases, camps, and other facilities as well as for establishing new ones also was an important function of this division. Indeed, the Real Estate Division participated in surveys and helped develop planning reports to identify and assess project land needs. Land was acquired through purchase, condemnation proceedings, or leases. Sometimes city governments donated the land. Two such cases were Hunter Air Force Base in Savannah and Seymour-Johnson Field at Goldsboro, North Carolina, where the Board of Aldermen passed the following resolution:

> "The City of Goldsboro stands ready to convey to the United States of America, for the nominal consideration of ONE ($1.00) DOLLAR, absolutely and by proper deed of conveyance all of its rights, title and interest in and to the premises known as Seymour-Johnson Field, together with all easements of every kind now held or owned by the City of Goldsboro as an appendant or appurtenant to the said premises."[17]

Other land was available through recapture clauses included in deeds on property disposed of as surplus after World War II. To determine the recapture possibilities, the Real Estate Division surveyed all former military installations within the real estate boundaries of the District. These included airfields, Army camps, and hospitals such as Finney General Hospital in Thomasville, Lawson General Hospital in Atlanta, and Battey General Hospital in Rome, Georgia; and Stark General Hospital in Charleston. The Real Estate Division also acquired land for the Atomic Energy Commission, the Army, and the Air Force. Table V shows the Savannah District installations eligible for recapture as of 1951.

## TABLE V

## LIST OF INSTALLATIONS IN THE SAVANNAH DISTRICT FOR WHICH QUIT CLAIM DEEDS PROVIDE FOR RECAPTURE, 1951*

### Georgia

Atlanta Municipal Airport
Bainbridge Army Air Field
Battey General Hospital
Chatham Field
Cochran Field
Cordele Municipal Airport
Daniel Field
Donaldsonville Auxiliary Field #2
Harris Neck Army Air Field
Hunter Field
Lake Park Air Field to Moody Field
Myrtle Auxiliary Field #5
Fort Oglethorpe (four deeds)
Statesboro Army Air Field
Sylvania Army Air Field
Thomasville Army Air Field
Tifton Municipal Airport
Camp Toccoa
Valdosta Municipal Airport
Vidalia-Lyons Auxiliary Field
Waycross Army Air Field
West Leesburg Auxiliary Field #3

### South Carolina

Aiken Army Air Field
Barnwell Municipal Airport
Charleston Army Air Field (two deeds)
Charleston Harbor Defenses (Fort Moultrie) (three deeds)
Columbia Army Air Base (three deeds)
Coronaca Army Air Field
Florence Army Air Field (two deeds)
Johns Island Municipal Airport
Myrtle Beach Air Force Base
Sand Hills Bombing and Gunnery Range
Walterboro Army Air Field

### North Carolina

Asheville-Henderson Airport
Bluethenthal Field (two deeds)
Camp Butner
Greensboro-High Point Airport
Knollwood Air Field
Laurinburg-Maxton Army Air Base (four deeds)
Camp MacKall

Morris Field
Raleigh-Durham Army Air Field
Seymour-Johnson Army Air Field
Camp Sutton
Winston-Salem Airport

*Adolph D. Simonson to Division Engineer, 3 Aug. 1951, FARC-EP, RG 77, Acc. No. 75A2093, Box 30B, file 601.1, Acquisitions.

Other activities and responsibilities of the Real Estate Division included surveying and mapping; doing appraisals and title searches; and relocating public roads, utilities, and even cemeteries on properties acquired for military use. Hunter Air Force Base was the site of one such cemetery relocation. Dedudding was still a concern during the Korean War, and the Real Estate Division oversaw this activity. Interviews in November 1952 with farmers cultivating land adjacent to Camp Butner in North Carolina disclosed that one farmer had a 105 mm dud in the field in front of his house and two piles of 37 mm and 57 mm duds that he had picked up in another field. Another farmer recently had plowed up a bazooka dud, and still another had found two 105 mm duds in his fields. Although these people were farming on land that the Corps had declared restricted, they claimed ignorance of any such restrictions.[18] The Real Estate Division also was responsible for pulpwood and timber harvesting on military installations during the Korean War. This was a major task considering the number of military installations and the extensive timber lands involved.

The end of the Korean Conflict in July 1953 signaled changes for the Savannah District. In late December Colonel Clyde C. Zeigler, Charleston District Engineer, urged the Savannah District to close the Area Real Estate Office it had operated in South Carolina during the war. He claimed that the decrease in military construction would no longer warrant maintaining a special office. Moreover, South Carolina politicians who opposed the proposed consolidation of the Charleston and Savannah Districts protested the full-time stationing of Savannah District personnel in South Carolina as a back door into combining the Districts. As one observer noted, "The consensus of opinion appears to be that consolidation is being effected on a piecemeal basis in order to overcome organized opposition."[19] Accordingly, the Savannah District Engineer closed the Area Real Estate Office in South Carolina. However, Savannah Real Estate Division personnel would continue to handle real estate matters from their home city. The Area Real Estate Office in Wilmington, North Carolina, was not closed, although it would be moved in the 1960s to Cary, North Carolina, because of civil projects needs.

The war's end resulted in a cutback in military construction, but not on the same scale as that at the end of World War II. Plans and contracts under way were not canceled. Because the needs of the Korean War were for far fewer installations, the District faced a much simpler job in demobilizing and disposing of surplus property and facilities. Only a few bases such as Daniel Field, which was declared surplus at the end of the war, had to be disposed of by the Real Estate Division. Despite discussion of closing some Army camps in Georgia, none were shut down. Both Camp Gordon and Camp Stewart became

permanent Forts in 1956, which necessitated new construction there. The District supervised contracts and construction at Fort Benning and other Army installations in the state also.

In the 1950s Secretary of State John Foster Dulles and Secretary of Defense Charles Wilson stressed the importance of the Air Force as a deterrent against the Soviet Union. Thus, Air Force bases received a great deal of attention, and the Savannah District was responsible for construction at all bases in Georgia. The Corps of Engineers played an important role in transforming the temporary Army and Air Force facilities of World War II — later rehabilitated for the Korean War — into permanent, modern, and comfortable buildings on enlarged installations.

In 1953, Camp Stewart was made a training center for tanks. Construction of tank firing ranges and maneuver areas began the next year. Stewart became the only camp to combine training in the use of both anti-aircraft artillery and tanks. During the summer months National Guard and Army Reserve units trained at Stewart as well. The Savannah District was in charge of all construction there in support of regular troops, officers, and reserves. New housing was a major part of the Corps' work at Camp (later Fort) Stewart during the 1950s. The Engineers built permanent barracks plus mess halls for enlisted men and new Capehart family dwellings financed under terms of the Capehart Military Housing Act. At the same time the Corps constructed two new administration and supply buildings and a central heating plant. To support the National Guard troops who trained at Fort Stewart each summer, the District in 1960 completed a permanent barracks complex including 33 mess halls and a tank concentration site that could handle approximately 800 tracked vehicles. When Camp Stewart was designated as a permanent installation in April 1956, a member of the Savannah Chamber of Commerce accurately observed, "You won't recognize this post if you come back a few years from now."

In preparation for the launching of America's first man-made satellite in the Vanguard project, the Corps of Engineers built 6 tracking stations. The Savannah District constructed a 17-acre station at Fort Stewart in 1957. The project included a headquarters building, powerhouse, camera shelter, pump house, trailer van filled with electronic equipment, and seven large horizontal antennae. In July 1958 the commanding officer of the Vanguard station requested that it be moved and enlarged. The District had the new site ready by the end of the year.[21]

Fort Benning was another focus of major construction activity by the District after the Korean War. In 1955 work began on the new Martin Army Hospital authorized during the war. The hospital was built under contract by the Jordan Construction Company of Columbus, Georgia, and cost more than $6 million. The Army accepted the nine-story, 500-bed facility, which was called as "modern and up to date as tomorrow's living," on 8 April 1958. One observer commented that "by the latter fifties, Fort Benning was beginning to catch up with some of the post's most necessary work."[22] This effort included new housing for both single and married troops. Eight 326-man barracks were completed in the fall of 1958 in the area called Kelly Hill. This project eventually included a total residential setting for soldiers, with headquarters, support, and recreation buildings for a battalion. Married men's housing was built as



*Capehart Housing for enlisted men at Fort Stewart, Georgia, completed in 1958. Each building had eight 3-bedroom units. (Savannah District, Corps of Engineers)*




*The nine-story, 500 bed Martin Army Hospital which was completed at Fort Benning in 1958. (Savannah District, Corps of Engineers)*



*The Kelly Hill Area at Fort Benning showing the 326-man barracks built in the late 1950s. (Savannah District, Corps of Engineers)*



*Representatives of the Savannah District, the Federal Housing Administration, the Williams Construction Co. of Columbus, and several banks are shown at the closing of the contract for Capehart Housing Project at Fort Benning on 29 January 1957. District Engineer Col. Robert C. Bahr is seated in uniform on the right side of the table. (Savannah District, Corps of Engineers)*

part of the new Capehart and regular Military Construction (MCA) programs. A new sewage treatment plant also was built, a project long overdue in view of reports that raw sewage from Fort Benning was being dumped in the Chattahoochee River.[23]

Construction at Fort Gordon was much more limited during these years, although the fort was made a basic training center between 1953 and 1955 and again briefly in 1957. Fort Gordon was threatened with being shut down in the late fifties as the Army considered reducing the Army to 900,000 men.[24] However, it survived the cutback, and soon the Corps again was supervising construction there, which included family housing units.

The Corps also built a hangar, runway, parking apron, and gasoline storage facilities at the Atlanta General Depot. After the Air Force left Lawson Field in 1955, it reverted to the Army as a support area for Fort Benning. The Army then built a taxiway system with lighting, hangars, repair shops, supply buildings, and a classroom building. The District also continued to build armories for the National Guard and Army Reserves. For example, in 1958 alone the District supervised construction of the armory at Athens, and additions to armories at Augusta, Macon, Rome, Columbus, Fort Valley, Tifton, and Hartwell.

In 1956 the District completed the Kings Bay Ammunition Loading Terminal for the Army near St. Marys. This was just one of several new ammunition loading facilities that were built in remote places as a precaution against the



*The U.S. Army Reserve Training Center Armory, Columbus, Georgia, 29 June 1960. (Savannah District, Corps of Engineers)*



*Construction of the Kings Bay Ammunition Loading Terminal near St. Marys, Georgia, 14 February 1956. (Savannah District, Corps of Engineers)*



*U.S. Air Force Hospital constructed at Hunter Air Force Base shown as of 22 June 1960. (Savannah District, Corps of Engineers)*

dangers associated with handling explosives in populated areas. However, the depot was never used by the Army for its original purpose, perhaps because of competition from the already established Sunny Point Ammunition Terminal in North Carolina. Instead it was leased to the Blue Star Shipping Corporation in 1958 for commercial shipping purposes.

With the attention being given to the Air Force and its value as a military deterrent through the threat of massive retaliation, the Savannah District was deeply involved in work at Georgia Air Force bases during the years of the Cold War. Dobbins Air Force Base at Marietta was the scene of construction of family housing, dormitories, and recreation facilities. Turner Air Force Base was designated a Strategic Air Command (SAC) field and as such required widening of runways and construction of new taxiways as well as the usual storage and support buildings. Hunter Air Force Base, also a SAC base, was likewise the center of much construction, including a hospital. However, the situation at Robins Air Force Base dramatized the current level of Corps construction activity.

Robins had been declared a permanent installation in 1952. This fact, combined with the demands of the Korean War, justified continued construction there on into the postwar era. Moreover, a devastating tornado struck the base on 30 April 1953, bringing new demands for construction to replace or repair the numerous damaged buildings. A headquarters building for the Fourteenth Air Force was completed in early 1955, as were three warehouses and a heating plant addition. The Savannah District began supervising construction of a new 10,600-foot-long, 300-foot-wide runway in February 1955. This project was completed in April 1956, seven months ahead of schedule. The runway included two sections of concrete pavement 15 inches thick and 1,000 feet long, one at each end, between which was laid asphalt pavement 17 inches thick and 8,600 feet long. This new runway was needed to accommodate the larger and heavier aircraft, including the B-52 bomber. Existing runways were converted into taxiways or parking aprons.[25]



*Building 210, Headquarters of the Fourteenth Air Force at Robins Air Force Base, 27 May 1955. (Robins Air Force Base, Office of History)*



*Construction of Air Material Command Warehouse No. 4 at Robins Air Force Base underway in 1955. (Savannah District, Corps of Engineers)*

Between April 1955 and June 1956 the Wesley Construction Company of Atlanta constructed an elaborate foam-water fire-protection system in two of Robins' large hangars. This task was enormous in that one of the hangars had a roof area of almost 13 acres. The entire arrangement called for 33 separate sprinkler systems in one building and 12 systems in the other. The project also included building a pump house and 500,000-gallon reservoir, as well as water-sprinkler and fire-alarm systems in additional buildings. Before turning the completed project over to the Air Force, Savannah District personnel tested six systems in each building, which involved activating approximately 800 sprinkler heads and spraying some 10,000 gallons of water and 700 gallons of foam per minute. An F-84 Thunderstreak jet was placed in the hangars, and a fire was simulated. The system worked beautifully.[26]

During 1956 Savannah District let contracts for airmen's dormitories at Robins "in line with the Air Force's policy of providing modern and better quarters for airmen at certain Air Force bases to boost morale and stimulate re-enlistment." At the same time contracts were awarded for an air communications net building (Air Comnet) and additional aircraft aprons to be used as service and maintenance areas. These contracts totaled approximately $1.5 million.[27]

The largest construction program at Robins since 1942 began in April 1958. By the first of July, the Corps had awarded contracts totaling approximately $26.5 million, with all work expected to be completed by January 1960. The placing of a Strategic Air Command unit at Robins accounted for a major part



*Testing the Foam-Water Fire Protection System constructed at Robins Air Force Base, 26 May 1956. (Robins Air Force Base, Office of History)*



*Paving operations for the SAC Airfield at Robins Air Force Base, 16 December 1958. (Savannah District, Corps of Engineers)*



*Construction of double 6ft. by 6ft. culverts as part of the extension and enlargement of runways at Robins Air Force Base to accommodate the SAC wing, 18 July 1958. (Savannah District, Corps of Engineers)*



*New Gymnasium completed at Robins Air Force Base in 1959. (Savannah District, Corps of Engineers)*

of the new work, especially the extension and enlargement of the runway, building of new taxiways, and construction of additional concrete aprons. The cost to build the aprons alone was $44.5 million, which covered concrete poured 15 to 20 inches deep and underground air, water, fuel, and power systems. The runway extension called for adding 1,000 feet at each end of the existing runway to accommodate the large SAC aircraft. Support buildings such as a maintenance shop and fuel storage facilities, a base communications building, a squadron headquarters, and instrument landing system transmitters also were built.[28]

Increased numbers of military personnel warranted additional housing facilities. The new construction included three 40-man bachelor officers' quarters; four 200-man airmen's dormitories; and a service club, a gymnasium, and a dining hall that could accommodate 800 men. Meanwhile, 273 units of Capehart family housing were completed by the summer of 1959. An additional 150 units were ready the following summer. This was the first military housing built on the base since the 1940s.[29]

Another aspect of military construction the Savannah District carried out for Robins was that of developing two Nike missile installations; one at Jeffersonville, Georgia, and the other at Byron, Georgia. Robins Air Force Base was home of the Fourteenth Air Force, a SAC wing, and the Warner Robins Air Materiel Area, which was responsible for aircraft repair and supply in support of Air Force installations around the world. The District constructed the missile sites as part of the defense network for the base.[30]

The Savannah District also was responsible for constructing Air National Guard installations at certain airfields in Georgia. However, this military construction transcended the usual military boundaries of the District. For example, District personnel supervised contracts at Morris Field in Charlotte, North Carolina, as well as at Travis Field in Savannah.[31]

The Construction Division in Savannah continued to oversee the military construction program while the state still was divided into sections headed by Area Engineer Offices. In 1955, for example, the Area Engineer Office in Atlanta supervised the work at Dobbins Air Force Base, Fort McPherson, Atlanta General Depot, Fort Benning, and Lawson Field. The Area Engineer Office in Macon was in charge of Robins Air Force Base, Moody Air Force Base, and Turner Air Force Base; while Hunter Air Force Base, Camp Stewart, Camp Gordon, and Kings Bay Ammunition Terminal were under the Area Engineer in Savannah. Each installation had a Project Office to supervise construction contract performance. In a location where construction was ongoing, the Project Office was virtually permanent. At other installations the Project Office was closed when a project was completed. Likewise, when new construction was authorized and funded, the Savannah District reestablished a Project Office. For example, authorization of construction of new family housing and dormitories at Dobbins Air Force Base prompted District Engineer, Colonel Robert C. Bahr in early February 1958 to write the commanding officer of the base, "It is desirable that a Project Office be activated during April at your installation for use by personnel I propose to assign for supervisory and inspectional duties."[32] As of 1 January 1959, the title of Project Engineer was changed to Resident Engineer. The Area Engineer supervised smaller operations not requiring full-time supervision.

## THE 1960s AND VIETNAM

Military construction in the Savannah District seemed to be increasing in the late 1950s. In 1958 alone the Engineers were involved in construction totaling $24 million and more than $50 million of work in military design. Yet the Office of the Chief of Engineers was contemplating a reduction in military work in the South Atlantic Division. In fact, other Districts within the Division, such as Wilmington, were seeing their military responsibilities decline. If the Korean War had necessitated a decentralization of military work among the various Districts, the present situation called for the reverse. The debate continued for three years, and for a while it appeared that Savannah would lose its military construction role. On 3 April 1961 the Division Engineer for the South Atlantic Division, Brigadier General H.A. Morris, directed that all of Savannah's military construction responsibilities except real estate be moved to the Jacksonville District office within the month; military real estate functions were to be transferred to Jacksonville some three months later. The Charleston and Wilmington Districts were to lose their military construction to Jacksonville as well.[33]

This decision angered local citizens and officials. According to a Savannah newspaper, city and state officials "waged a vigorous campaign to stop the relocation." District personnel developed some convincing economic facts and figures with which to argue against the move. Acting Chief of Engineers, Major General Keith R. Barney, finally announced that the military work of 31 Districts was to be apportioned among 19 Districts. The Savannah District, however, was to be one of the 19. The District gained rather than lost responsibilities, for the plan added the military construction in North and South Carolina formerly under the Wilmington and Charleston Districts. The transfer from the Charleston District was effective in June 1961, and that from the Wilmington District as of July. Savannah now assumed military construction responsibility for such major installations as Fort Bragg, Pope Air Force Base, and Sunny Point Army Terminal in North Carolina; and Fort Jackson and the Charleston Army Depot in South Carolina. National Guard construction also was included. The Corps of Engineers explained the decision by saying: "Subsequent to the earlier studies a substantial increase in the level of the Military Construction program of the Savannah District has developed." While the Savannah District may have been most capable of handling the new workload, the fact was that considerable political pressure had been applied to prevent the shift of military construction to another District and to reassign additional military responsibility to the Savannah District office. In fact, the report of these changes came after the Acting Chief of Engineers met with Georgia Senator Richard B. Russell and Georgia Congressmen Carl Vinson and Elliott Hagan. Russell and Vinson chaired the Armed Services committees in the Senate and House at that time.[34]

The anticipated decline in military programs that had precipitated the South Atlantic Division's military reorganization did not materialize for the Savannah District in the first few years of the 1960s. In fact, during those years the Construction Division had a record number of contracts under way for a peacetime situation.[35] Notable among these projects was the construction of the Infantry School Academic Building at Fort Benning.



*Infantry Hall at Fort Benning shortly after its completion in 1964. Winner of the 1965 Distinguished Architectural Achievement Award. (Savannah District, Corps of Engineers)*

Although Fort Benning was the world's most renowned infantry school, its classroom and other training facilities had become inadequate. Instruction was given in various rehabilitated and remodeled World War II buildings. In 1958 Congress funded the construction of one large building to house the entire academic setting. The Savannah District carried out the design and the construction, which began in July 1962. The project was completed two years later, with final costs exceeding $8 million. The H-shaped building, named Infantry Hall, housed both the Infantry Center and the Infantry School and had a floor area of 12 acres. The six-story central section had office space for more than 1,000 military and civilian workers while the two large wings on each side provided 27 classrooms. A large auditorium extended from the rear of the central section. With the building's completion, all phases of infantry instruction except field training and vehicle maintenance could be under one roof. In a Corps-wide contest instituted by the Chief of Engineers, this building won for the Savannah District in 1965 the first "Distinguished Architectural Achievement Award" for best designed military structure.[36] Other Corps-supervised construction at Fort Benning included a $500,000 service club for enlisted men in the Kelly Hill area, completed in May 1965, and a $1 million bridge over the Chattahoochee River linking Fort Benning with Alabama. Finished in late summer 1964, the bridge replaced an old pontoon bridge suitable for one-way traffic only. Moreover, District personnel designed and contracted for a new

branch library to be built for the Infantry School.[37]

Not long after Fort Jackson was transferred to the Savannah District, a $30 million to $40 million program for building new barracks complexes was begun there. At Fort Stewart a permanent barracks complex that provided three-story brick barracks, two mess halls, a central heating plant, and two new administration buildings was completed in 1960. Two years later two battalion headquarters buildings were completed. The District also added 132 units of family housing. In addition, the firing ranges and training areas were enlarged; and an airstrip, a motor repair shop, and a tank repair shop were built. These were all permanent structures as compared to the temporary buildings of earlier days.[38]

At Fort McPherson in Atlanta, an enlisted men's barracks was remodeled, while new family housing units and a bachelor officers' quarters were constructed at Pope Air Force Base. Elsewhere a steam plant at Robins Air Force Base was modified and an electric emergency power facility at Aiken Air Force Station was constructed. In October 1964 contractors broke ground for six two-story classroom buildings at Fort Gordon; construction of a new multi-million-dollar academic building there for the Signal School would follow. The Fort Gordon projects were said to "herald the beginning of permanent-type construction" on the post. In the summer of 1965 one newspaper reported, "More than $18 million worth of current construction is changing the face of Ft. Gordon from its World War II temporary look to one of bricks and steel buildings. And there's more to come." Later that year another article declared that "construction is everywhere."[39]

By the mid-sixties, military construction in the Savannah District was being stepped up since the conflict in Vietnam was escalating. The Defense Department initiated a major buildup in both troops and facilities to train and serve them. In the fall of 1965, the draft was expected to jump to 35,000 men per month in an effort to enlarge the Army to more than 1,200,000 troops.[40] Recruits began to pour into Forts Benning, Gordon, Stewart, Bragg, and Jackson for basic or specialized training. These posts plus other Army and Air Force installations were among the nation's most important military centers, and all were in the Savannah District's charge. One joke circulating among congressmen at the time asserted, "If you put any more bases in Georgia, you will have to double-deck the state."[41] Even Hunter Air Force Base, scheduled in late 1964 to be closed within three years as part of a military cutback, was converted to an Army Airfield to train helicopter pilots. The Savannah District came to have the largest military construction program in the continental United States.[42]

The activity at Fort Gordon continued through 1965 and into the years of the Vietnam conflict. Phase I construction of the Signal School complex began in 1965 and was completed at a cost of $7 million. During this phase, 300,000 square feet of floor space was built. Phase II of the complex was under way in 1968. Other construction included a 3,200-man barracks complex, additional bachelor officers' quarters and family housing, and a motor repair facility. Likewise, two target ranges were built, and an older one was rehabilitated. Hospital mess facilities were remodeled at the World War II vintage hospital. A new electrical distribution system was added as were new roads, bridges, a storm sewer system, and a spur railroad.[43]

The war in Vietnam occasioned major work at Fort Benning and Lawson

Field as well, and involved both new construction and rehabilitation of existing structures. A new reception and basic training center was completed in September 1965. A $5.5 million expansion of the Officer Candidate School facility followed in 1966. Of particular significance was the remodeling of one of the five large Quartel buildings, which were built before World War II, into bachelor officers' quarters. The Quartels are both architecturally and historically significant. The outside perimeter of one Quartel is a mile, and the building has been described as the "largest U.S. Army billet under one roof." To tear down the edifice and build new quarters would have cost four times as much as renovating the Quartel. The Savannah District drew up the plans and supervised the work, which was completed in 1967.[44]

Concurrent with the work at Fort Benning was $4.5 million in improvements at nearby Lawson Field. The projects included expanding the runways to accommodate the Air Force's largest and fastest jets such as the C-141 Starlifter and the C-5A carrier, constructing taxiways and parking and holding aprons, renovating existing hangars, constructing a control tower and operations building, and installing lights and an instrument landing system. At that time, Lawson Field was assuming an extremely important role in Army aviation and in the rapid deployment of troops, and it was one of the busiest airports in the nation. These projects were finished in 1966 and 1967.[45]

Because of the war in Vietnam, in April 1966 Fort Stewart was made a support training base for the U.S. Army Aviation School at Fort Rucker, Alabama. This was in addition to its role as a training site for tank warfare and National Guard units. As a result, additional hangars, runways, parking aprons, and auxiliary stagefields were needed. Two 2,000-foot runways were constructed, running parallel to the existing runways at Liberty Army Airfield adjacent to Fort Stewart. Special landing strips were placed in various locations on the reservation to facilitate training Army pilots in the use of small planes used in enemy observation in Vietnam.[46]

As Vietnam became a helicopter war for the Army, Secretary of Defense Robert McNamara in December 1966 ordered the training of 50 percent more helicopter pilots. The next year Fort Stewart and Hunter Army Air Field, recently transferred to the Army from the Air Force, were together designated the U.S. Army Flight Training Center, the site of an accelerated helicopter training program. Much of the construction in 1967 related to this new program. The Corps let contracts for construction of four rotary wing stagefields and one large rotary-wing basefield. The stagefields were large heliports that included six parallel runways spaced 225 feet apart in two groups of three each. Each runway had three landing pads. The basefield, dedicated on 7 December 1967 as the Evans Army Heliport, consisted of four hover lanes, eight approach pads, an air traffic control center, an air rescue base, maintenance facilities, classrooms, mess facilities, and an operations center. Built at a cost of $2.5 million, it could accommodate 107 rotary-wing aircraft, principally the UH-1D helicopters known as "Hueys" and used extensively for troop transport in Vietnam. Four pinnacles also were built; these were small, raised landing areas used to train pilots to land on slopes. Ground-controlled approach radar and nondirectional beacon sites were added, several buildings were rehabilitated for use as classrooms, and a 10-story control tower was built.[47]



*U.S. Army Reception and Processing Center at Fort Jackson dedicated in October 1970. Compare the size and design of this structure with the two World War II vintage buildings in the upper left hand corner. (Savannah District, Corps of Engineers, photo by Cleo Brown)*

The Vietnam era construction boom also extended to Fort Jackson and Fort Bragg. Fort Jackson was still an important induction center for the Army, and the troop buildup for the Southeast Asian conflict necessitated building new barracks complexes with support utilities systems. One such complex of 32 buildings was completed in 1967, another consisting of 31 buildings was finished in 1968, and yet another was completed in 1969. Brigade headquarters buildings, specialized facilities for electricians and mechanics, and chapels also were added. As of summer 1968, another 249 family housing units had been completed, and 180 were under construction. That same year the Corps contracted for a new 12-story, 435-bed hospital to replace the "temporary" hospital that dated back to World War II. Likewise, a new reception and processing center for new recruits was constructed at this time and dedicated in October 1970. The building won for the District another first-place award in the Chief of Engineers' architectural design contest. Finally, the District constructed new rifle ranges complete with the latest in automatic, electronic controls.[48]

Fort Bragg had experienced a significant decline after the Korean War. Thus when the buildup for Vietnam came, the Savannah District faced a major task of rehabilitating many of the old buildings as well as constructing new ones. As elsewhere, much of the effort involved constructing new barracks complexes



*The John F. Kennedy Center for Special Warfare, Academic Building, at Fort Bragg, North Carolina, winner of the 1966 Distinguished Architectural Achievement Award. 27 February 1966. Also note the new high rise Bachelor Officers' Quarters in the distance. (Savannah District, Corps of Engineers)*

costing some $10 million each as well as new bachelor officers' quarters. The District also designed and built a support airfield at Fort Bragg's Simmons Air Field, which required runways, hangars, and repair shops. Of most significance, however, was the John F. Kennedy Special Warfare Training Center. This facility provided administrative and classroom space as well as barracks for the Special Forces Green Beret troops that trained at Fort Bragg. The Headquarters Building won the Distinguished Architectural Achievement Award of 1966 for the Savannah District.[49]

Some of Savannah District's projects were what Colonel William L. Barnes, District Engineer in 1968, called "behind the scenes" projects. For example, the District participated in one test called "Rat Hole," which involved constructing tunnels in the Clark Hill area where the soil conditions were similar to those in Vietnam. The tests were designed to see if powdered aluminum could be blown into the tunnels and then ignited, thus exploding and destroying the tunnels. Although the tactic worked, when it was later employed in the war the enemy simply abandoned the tunnels, and the flames blew back out onto the Americans.[50] District personnel also were responsible for building model Vietnamese-type villages at Forts Benning, Gordon, and Jackson, where troops trained in as realistic a setting as possible.

The District's construction for the Air Force during the late 1960s was not nearly as extensive as that for the Army, perhaps with the exception of Robins Air Force Base. At the end of 1967, for example, the Corps had completed one $880,000 contract at Dobbins Air Force Base and two contracts at Moody Air





(b)

*Operation "Rat-Hole": (a) view inside Tunnel Shaft "B"; (b) dust coming from entrance to Tunnel Shaft "B" during blasting operations; (c) view of damage done to Tunnel Shaft "B" by blasting procedures. (Savannah District, Corps of Engineers, 14 February 1956)*



(c)




*Vietnam Village, Fort Gordon, Georgia. This is an "inhouse" design of training facilities built in 1967. (Savannah District, Corps of Engineers)*

Force Base totaling $1.9 million. However, nine contracts were finished at Robins costing almost $7 million. On the other hand, by that same time six construction contracts had been completed at Fort Benning at a cost of $8.7 million, and seven had been completed at Fort Gordon at $5 million. Another $7 million in contracts had been completed or were near completion at Fort Stewart-Hunter Army Air Field.[51]

Projects at Air Force installations during these years included such major undertakings as warehouses, officers' quarters, and basic flight training facilities at Moody; and a new fire station at Dobbins. The District supervised contracts at Pope Air Force Base for additions to the taxiway and aprons, quarters for airmen and bachelor officers, a Special Forces chapel, and a Tactical Airlift Command headquarters. Construction contracts at Robins resulted in major additions there such as two 200-man airmen's dormitories, a large aircraft maintenance deck, a chapel, officers' quarters, and a $3 million electroplating and metal-finishing facility. Other construction involved more minor work such as modifications to the doors of a hangar, remodeling of an aircraft paint facility, and an addition to the base communications building.[52] Turner Air Force Base was turned over to the Navy in 1967.

The task of meeting the construction needs at the various installations as demanded by the Vietnam conflict has been compared to the situation at the beginning of the Korean War. Both emergencies called for "crash schedules," and both required rehabilitation and modernization of existing facilities as well as construction of new ones. However, the District was far more prepared for the job in the 1960s than it had been in 1950. As the Vietnam War intensified, the District already was contracting much of its design engineering out to private firms. Moreover, Resident Engineer offices were functioning at the major bases and Forts.[53] To be sure, the nation had followed its traditional pattern after World War II — that of large-scale demobilization. However, the Cold War years of the 1950s saw no such massive dismantling of bases after the Korean War, at least not in the Savannah District area. Despite some cutbacks, current defense needs and supportive politicians in Washington kept the installations in Georgia and the Carolinas active and the Savannah District heavily involved in military construction. The years from 1953 to 1965 were in fact years of transition from temporary to permanent structures, and Savannah District personnel had been responsible for the conversion. Thus the Savannah District was ready when the Vietnam buildup came.

The Savannah District also carried out projects at smaller installations. One project included a 350-railcar holding yard at the Sunny Point Army Terminal at a cost of $2.1 million. Another project was for $2 million in construction at the Tarheel Army Missile Plant in North Carolina. The District also was responsible for work at Army Reserve Centers in Columbia, South Carolina, and in Atlanta and at Air National Guard facilities at Travis Field in Savannah.[54]

The Real Estate Division's role in military matters during the 1960s focused on acquisition of military maneuver areas for troops at the various Army posts. Millions of acres of land would be made available for such training through permits and licenses negotiated with private landowners and through use agreements obtained from the Forest Service. For example, in 1963 six million acres of land were provided in South Carolina, southern North Carolina, and parts of

eastern Georgia for maneuvers by the Strike Command. This territory was needed for training exercises related to a possible invasion of Cuba should such action become necessary in light of deteriorating U.S.-Soviet relations following the Cuban Missile Crisis a few months earlier. In 1964 the Real Estate Division was asked to obtain use of private land over approximately one-half of eastern South Carolina in support of military training exercises by Fort Benning troops preparatory to activating the 11th Air Assault Division, the first air mobile division created by the Army. In 1967 Real Estate Division personnel leased 60 sites in the Fort Stewart area from private landowners to be used for tactical landing fields. In addition, the planned helicopter training program at Fort Stewart and Hunter Army Air Field necessitated acquiring additional training sites and landing fields in Georgia and South Carolina.[55]

The command at Fort Bragg decided that additional land was needed for training the Army's Special Forces there. Subsequently, the Real Estate Division acquired use of approximately one million acres of land in the vicinity of Fort Bragg, and use agreements with the Forest Service made available all of the national forests in North Carolina and the Cherokee National Forest in Tennessee. A real estate office was established at Southern Pines, North Carolina, to handle the licenses and to investigate and settle any claims that arose. Similarly, a real estate office was set up in Jacksonville, North Carolina, and 2,300,000 acres of land were acquired for training activities in the area of Camp Lejeune, North Carolina.[56]

Timber harvesting continued to be a major activity on certain posts, particularly the large ones with thousands of acres of timber land. Resident foresters working under the District's authority managed the forests, and the Real Estate Division authorized contracts with timber companies. In the 1960s the sale of timber and forest products harvested at Fort Stewart alone brought more than $1 million each year.[57]

## THE ERA OF THE NEW ARMY

The early 1970s were a transition period for military construction, at least within the boundaries of the Savannah District. Not only had most of the demands of the Vietnam War been met, but growing popular opposition to the nation's involvement in the conflict portended deescalation and withdrawal of American troops. However, plans and designs already prepared awaited execution. For example, both Fort Gordon and Fort Jackson had long-range construction planned as part of the continuing effort to replace temporary structures with permanent buildings. Hence, new construction and maintenance services would continue. Only Fort Stewart and Hunter Army Air Field felt the full impact of the Vietnam truce as the Army began to phase out the helicopter training program there and severely cut back the fixed-wing program. In September 1973 Hunter was deactivated and placed in a caretaker status; Fort Stewart lost its role as a Flight Training Center and was redesignated simply a U.S. Army Garrison. One Fort Stewart civil servant confessed that "it appeared that Fort Stewart was doomed to oblivion."[58]

Another factor explaining the continuing construction activity was the Army's reorganization after 1 July 1973 into new commands, such as the

Training and Doctrine Command (TRADOC) and U.S. Army Forces Command (FORSCOM). These changes altered the function of many of the Army bases. The Savannah District was affected tremendously by these changes because of the number of Army installations within its military construction boundaries. Fort McPherson and Fort Bragg, for example, were designated FORSCOM bases, as the Stewart-Hunter complex was later, and Fort Benning and Fort Jackson were included in TRADOC. Even though the size of the Army decreased during these years, design and construction increased substantially.[59]

Of equal significance was the fact that the nation ended the draft and converted to a volunteer Army. The Army then implemented its Modern Volunteer Army concepts, which sought to change the image of the soldier and the Army base in an effort to make military service more attractive to prospective recruits. The District would have a major role in creating bases that offered "a normal environment, a place the soldier and his family could enjoy living, shopping or relaxing and even be proud of."[60] This involved rehabilitating and remodeling existing living quarters and building new ones similar to college dormitories. Living suites that provided privacy became common, and both interior and exterior decors were improved. Mess halls were designed to look like English pubs or German beer gardens. Shopping malls and community centers were built. More modern family housing units with all the style and design of a suburban community were added or converted from existing base housing. Hospitals were built or renovated as were academic facilities. This construction also included building or adding on to repair shops, utilities systems, and other support facilities. The Real Estate Division secured new recruiting offices, and modern and attractive Army Reserve Centers such as the one in Columbia, South Carolina.

The "new look" started in the late sixties, and by the first years of the seventies was well under way. Financial statistics reflect the level of military construction as well as the effects of inflation. Fort Bragg, for example, was the focus of expenditures totaling $28.9 million in FY72, $16.5 million in FY73, $28.8 million in FY74, and $26.4 million in FY75. Fort Gordon and Fort Jackson averaged $12 million to $15 million in the first half of the decade.[61] The years 1975 and 1976 saw a dramatic upturn in projects and expenditures. The nation was investing in a strong defense despite the criticisms of the military involvement in Vietnam. Savannah District construction expenses for 1980 were close to $100 million. Thus, since the end of the Vietnam conflict in 1975, the District's military role had increased in the era of the Modern Volunteer Army.

The "new-look" program was initiated in stages, with Fort Bragg as a pilot project. New barracks and family housing as well as renovation of Womack Army Hospital were part of the work there. A multipurpose athletic facility was completed in 1965, which even included provisions for an ice-skating rink. The program soon was extended to Fort Benning and Fort Jackson, where living quarters for singles and families were added. In 1972-1973 a shopping mall was built at Fort Benning offering retailing, banking, restaurant, and entertainment facilities.

Two notable achievements at Fort Gordon were completion of Phase III of the Signal School and the Dwight D. Eisenhower Army Hospital. Completed in 1973, the Signal School was part of the long-term building program at Fort



*A view of Fort Jackson, South Carolina, 28 April 1970, showing World War II era construction still in use at that time. (Savannah District, Corps of Engineers)*



*Moncrief Army Hospital at Fort Jackson, one of the new hospitals built by the Corps of Engineers at various Army installations as part of the "new look" on Army posts. (Savannah District, Corps of Engineers)*



*The "new look" at the Fort Gordon Hospital. (Savannah District, Corps of Engineers)*

Gordon. The project provided classroom buildings, barracks, training facilities, an auditorium, a library, and administration buildings. It was described as providing facilities similar to those of a university.[62] The Eisenhower Hospital replaced the Camp Gordon Station Hospital, which had been built at the beginning of World War II. The 14-story, 760-bed medical center, built at a cost of nearly $27.5 million, called for the largest single military contract ever handled by the Savannah District as of that time.[63] Barracks, officers' quarters, and a service club also were added to Fort Gordon during the 1970s.

The District's most dramatic accomplishments were at Fort Stewart and Hunter Army Air Field. On the brink of being closed down in 1973 and early 1974, this military complex entered a new era in April 1974 when it was designated as the new home of the 24th Infantry. The troop buildup there necessitated a major push in construction. Existing barracks were modernized, and two new barracks complexes were built to house 3,700 men. These contracts alone totaled $46 million.[64] Family housing, recreational complexes, a chapel, and a shopping center were also part of the new construction. The FY79 appropriation for Fort Stewart was more than $62.8 million, the largest for any Army post in the nation. It marked the fourth time in five years that the Fort Stewart appropriation had exceeded $50 million. According to Army officials, this was all part of a "modernization and upgrading of Fort Stewart and Hunter Army Air Field" that would make the installation a national showcase.[65]

While significant, the District's construction role on Air Force bases continued to lag somewhat behind that on Army posts in the 1970s. The Tactical Air Bases at Moody Air Force Base in south Georgia and Seymour-Johnson Air Force Base in North Carolina, as well as Dobbins Air Force Base at Marietta,

remained the District's responsibility. Pope Air Force Base near Fort Bragg took on a support role for the 82d Airborne Division there. Furthermore, the District has had a role in supporting the Rapid Deployment Force. Robins Air Force Base, however, continued to command the greatest share of attention because of the Air Logistics Center and SAC base there. According to some observers, the "lack of modernization and new construction had seriously impaired WRA-MA's [Warner Robins Air Materiel Area's] ability to effectively and economically support the Air Force mission." Moreover, only 40 percent of Robins' buildings were permanent; most still dated from World War II and the expense of their upkeep was mounting.[66] In 1970 a new Base Exchange shopping complex was started, more on-base housing units were built, and major industrial and administrative projects were carried out. Among the latter were a flight line control tower, a plating and metal-finishing shop, warehouses, an air freight terminal, a precision measurement and evaluation laboratory, and an electronic warfare building.

Throughout the years since 1941 when the responsibility for Army construction was returned to the Corps of Engineers, the Savannah District faced many challenges. The District met the emergencies of war, provided facilities, executed demobilization cutbacks, and adapted to the designs and construction demands of increasingly sophisticated military requirements. The Engineers, however, faced a new problem at several installations in the 1970s. It was the red cockaded woodpecker! As the Corps built new camps and training facilities in the forest lands of Georgia, South Carolina, and North Carolina over the years, it had to deal with the wildlife of the region. Passage of the Endangered Species Act of 1973 protected certain animals listed as endangered by the Government,



*Control Tower, Dobbins Air Force Base, Marietta, Georgia, 1985. (Savannah District, Corps of Engineers)*

including the red cockaded woodpecker. The bird liked to nest in old trees, some 80 years old or older, and such trees were uncommon in much of the South because of the lumber industry. But, as one spokesman for the Fish and Wildlife Service noted, "We have a lot of old ranges here [on military bases] that the lumber companies can't get into because of the shrapnel in the trees. So the trees are getting old, and especially with the physical damage, they're susceptible to red heart disease (a fungus), and the birds are doing fine." "They're all over the place," reported Colonel Tilford C. Creel, Savannah District Engineer in 1980. The Corps ran into problems in various types of construction at Forts Stewart, Jackson, Benning, Gordon, and Bragg because of the red cockaded woodpecker. At the Sunny Point Military Ocean Terminal in North Carolina, one project had to be completely redesigned to avoid the bird's favorite trees.[67] The Corps was experiencing the environmental consciousness of contemporary America.

Enhanced through the support of the pro-defense Reagan administrations, the modernization and "new look" emphasis in the military continued into the succeeding decade along with general expansion of military facilities. The Savannah District, with its broad military boundaries still encompassing Georgia, South Carolina, and North Carolina and their major Army and Air Force installations, reaped a lion's share of the military work carried out by the Corps of Engineers. The early 1980s witnessed a 10.8 percent rise in all military expenditures by the Savannah District as compared to a 3.6 percent decline in civil projects spending.[68] In August 1984 the District reported that construction contracts currently underway totaled $248,361,755. And this figure did not include the several hundred millions of dollars in design contracts yet to be started.[69] Approximately $124 million worth of military construction was initiated by the District in FY84 alone.[70] At the end of the decade, Col. Ralph V. Locurcio, the present District Commander, declared that the Savannah District placed $140 million in military construction in FY89 and had 126 projects valued at $359 million under construction during that same period.[71] Design contracts for future work continued to run into the hundreds of millions of dollars also.

The Savannah Distrtict's premier military project in the 1980s was at Fort McPherson in Atlanta, headquarters for the U. S. Army Forces Command (FORSCOM) which coordinates all Army Reserve, National Guard, and Active Army troops throughout the continental United States, Alaska, Puerto Rico, and the Virgin Islands. Because of its comparatively small geographical size, this installation had not experienced much construction activity since World War II. However, in 1981 Congress approved plans for a new FORSCOM Command and Control Facility there. Currently this critical aspect of the nation's military was housed in various World War II vintage buildings at the Fort and at Fort Gillem several miles away. The new facility, called Pentagon South by some, would house the entire command in a single, ultra-sophisticated structure.

The Savannah District contracted the project in September 1983, and actual work began in November. As space was lacking on this 500-acre post, 17 World War II era buildings were razed to make room for the three-story plus full basement building of 356,000 square feet. Construction was completed in



*The new Winn Army Community Hospital at Fort Stewart which was dedicated in 1983. (Savannah District, Corps of Engineers)*

November 1986 at a cost of approximately $37 million and several months behind schedule due to problems with the contractor. In the second phase of the project, another 26 old buildings were demolished to provide space for parking at the new facility.[72] The District won honorable mention in the 1987 Chief of Engineers Design and Environmental Awards Competition in the "interior design" category for the Command and Control Center at Fort McPherson.

Construction at Fort Stewart and Hunter Army Airfield remained at a high level with a few projects dominating public attention. For example, the Winn Army Community Hospital was dedicated at Fort Stewart in May 1983. This hospital replaced the installation's outdated and old-fashioned World War II vintage medical facility with its numerous wooden buildings connected by covered walkways. The District also designed and supervised the construction of a wood-burning plant which was completed in late 1984. The first such plant of this type built for the Army, it burns waste wood which normally would be discarded and reportedly can supply 95 percent of the energy needs at Fort Stewart. The boiler has a capacity of 80 million BTU per hour. The anticipated savings in fuel costs were enormous at the time the facility went into operation, and it was expected to pay for itself in less than five years even with an initial pricetag of approximately $7.4 million.[73] The District broke ground for a new family housing complex about this same time, and a new enlisted men's barracks was completed. A $13.8 million sewage treatment plant was dedicated in November 1985. It is unique in that while it is located on government property, it was funded in part by city and state funds as well and serves the nearby community of Hinesville also. The list of projects through the middle and late 1980s included such items as new tactical equipment shops, a flight simulator



*The wood burning plant built at Fort Stewart in 1984, designed to burn waste wood to supply energy needs throughout the post. (Savannah District, Corps of Engineers)*



*The Fort Stewart sewage treatment plant dedicated in November 1985. (Savannah District, Corps of Engineers)*



*The Central Vehicle Wash Facility built by the Savannah District at Fort Stewart. (Savannah District, Corps of Engineers)*




*Johnston Hall, a "One Station Unit Training" facility dedicated by the Savanna, District at Fort Benning in 1983, with a new group of recruits. (Savannah District, Corps of Engineers)*

facility, modernization of dining facilities, and a unit maintenance hangar. These and numerous other projects at Fort Stewart helped to account for the high level of military construction for the Savannah District at this time.[74]

At Fort Benning the District oversaw design and construction of a new facility for receiving and processing recruits as part of the "One Station Unit Training" program instituted by the Army. Dedicated in 1983 as Johnston Hall, the $5.9 million structure can prepare 660 recruits a week for basic training.[75] Other major projects in 1984 and 1985 included new barracks with dining facilities and the infantry fighting vehicle range. Between October 1985 and November 1987, the District supervised construction of the Donald C. Faith, Jr., Middle School, one of nine schools in the Fort Benning school system, at a cost of approximately $4,395,000.[76] Two new trainee barracks built at a cost of over $32.5 million, conversion of unaccompanied officers quarters at a cost of nearly $16 million, an infantry fighting vehicle maintenance and gunnery training facility at a cost of over $10.6 million, and new highway construction at a cost of nearly $8.5 million reflected the level of Savannah District military work at this Army post.[77]



*A technician uses the Energy Monitoring and Control System at Fort Benning to control temperature and air flow in most of the buildings. (Savannah District, Corps of Engineers)*

In the summer of 1989, the District awarded a $22.8 million contract for construction of facilities for the U. S. Army School of the Americas. Originally located in Panama, the School of the Americas was transferred permanently to Fort Benning in 1986. It provides training for officers, non-commisioned officers, and soldiers from nations in the western hemisphere. The project calls for construction of several new buildings, including a four-story multipurpose building, and rennovation and modernization of several existing structures.[78]

One usually thinks of some type of construction or building modification as comprising the District's military work responsibilities, but other types of projects involve the District as well. A good case in point is the Energy Monitoring and Control System (EMCS) installed at Fort Benning between 1980 and 1989. Under orders from the Training and Doctrine Command (TRADOC), Fort Benning was required to reduce its energy consumption. The multi-million dollar EMCS allows engineers by computer to monitor the temperature and air flow, to turn off or on heating and air conditioning units as energy use-levels demand, and to maintain automatic time schedules for heating or cooling in nearly all the buildings throughout the post. Phase I of the system went into operation in 1981, and Phase II was completed in 1987. Phase III was under construction in 1989.[79]

A sub-installation of Fort Benning and TRADOC Ranger training facility known as Camp Merrill was the site of Savannah District design and construction work between October 1986 and the fall of 1988. This facility, located in the Chattahoochee National Forest about 12 miles north of Dahlonega, Georgia, teaches Army Rangers mountain warfare and small unit warfare tactics following their basic training at Fort Benning. Described as resembling a Hollywood set for a POW camp, Camp Merrill consisted primarily of plywood huts offering little protection against freezing winter temperatures. It was primitive by any standards and certainly those of the "New Army." The Savannah District supervised the work which included razing the 19 existing structures and building a two-story students living quarters, a two-story bachelor enlisted quarters, a gym, and several support buildings as well as renovating the bachelor officers quarters. The cost of the project was over $4.3 million.[80]

The Savannah District was active in new projects at Fort Gordon also. Included among them was a new auto craft center which opened on the post in March 1984. This state-of-the-art facility houses auto mechanics classroom facilities, a paint and body shop, and service area complete with the latest computer assisted repair technology. A new academic training building costing more than $4.9 million and new barracks and dining hall complex costing in excess of $21 million were major projects on this post during the 1980s as were another addition to the Signal School and a satellite communications facility.[81]

Fort Jackson enjoyed a flurry of Corps supervised construction during the decade of the 1980s. At the end of 1985, some $97 million worth of new construction projects were underway there. A major upgrading of the electrical and mechanical systems at Moncrief Army Hospital was undertaken costing over $13.7 million. A new commissary building opened in early 1986 and won honorable mention in the Corps of Engineers' 1989 Design and Environmental Awards Program from a field of almost 60 entries. The Child Development Center and Chapel, the first multi-functional educational and religious center



*Army Rangers from Fort Benning relax outside the old plywood huts that served as housing for many years at Camp Merrill. (Savannah District, Corps of Engineers)*



*New barracks under construction by the Savannah District for Army Rangers at Camp Merrill. (Savannah District, Corps of Engineers)*



*The new Commissary at Fort Jackson which opened in 1986. (Savannah District, Corps of Engineers)*

built for the Army, was completed in March 1986 and replaced three dilapidated World War II buildings that had been the child care center for several years. The new Troop Medical Clinic at Fort Jackson won a second 1987 Chief of Engineers Design and Environmental Award honorable mention for the Savannah District in the "architecture" category. Moreover, this same structure received an "Award for Design Excellence" from the Department of Defense in 1988 in the medical facilities category. Modernization of existing buildings as well as construction of new post facilities and family housing continued to command the District's attention at Fort Jackson to the end of the decade.[82]

The home of the 82nd Airborne Division, the Special Operations Command (SOCOM), and training for U.S. Special Forces, Fort Bragg experienced a construction surge in the 1980s that put it in first place among all Savannah District military construction sites. As of the summer of 1986, for example, 42 construction contracts reportedly were underway at a value of more than $140 million.[83] By the end of the decade, 34 percent of the District's military construction projects were at Fort Bragg.[84]

Several major projects dominated the list. A new Child Care Center costing more than $3 million earned for the District the Honor Award, the highest award, in the Design and Environmental Awards Program in 1985. A new elementary school, a $4.3 million commissary addition, a gymnasium and racquetball courts, a physical fitness center, new barracks and dining facilities, and improvements to family housing were among the projects that reflected the "new look" emphasis at Fort Bragg. As one District project engineer commented, decent housing and modern facilities were needed "to motivate the troops." He explained that the special troops at Fort Bragg were usually on their third tour of duty, and "in order to keep them in and to make it 'worth their while', so to speak, the Army definitely wants to give them facilities that will motivate them."[85] Millions of dollars also were pumped into more traditional military construction. Early in the decade the District completed a Military Operations and Urban Terrain (MOUT) city, a training facility for troops



*The Fort Bragg Child Care Center. (Savannah District, Corps of Engineers)*

preparing to fight in an urban environment. Other projects included vehicle maintenance facilities, a new Special Operations Command barracks and operations complex, administration buildings, an anti-armor range, a sniper range, a flight simulator, and a new Special Forces support facility. As the decade ended, groundbreaking ceremonies heralded the start of a new academic facility for the John F. Kenney Special Warfare Center.[86]

As was true in the 1970s, District projects at Air Force bases continued to lag behind the military work done on Army facilities during the 1980s in both numbers and dollar value. And, both statistics declined over the decade except at Seymour Johnson Air Force Base. The only major project at Moody Air Force Base was housing for unaccompanied enlisted men. Maintenance facilities were the main projects at Dobbins Air Force Base. The District awarded large contracts for base transportation and supply complexes at Pope Air Force Base. A small aircraft maintenance dock, F-15E flight simulator, and aircraft maintenance and supply buildings were the major projects at Seymour Johnson Air Force Base. Robins remained the focus of most of the Savannah District's Air Force construction. An airplane cleaning and painting facility, a vehicle maintenance complex, additional storage facilities, additions and alterations to an avionics repair facility, new dining facilities, and additions and alterations to a weapons systems support center were among the major projects there.[87]

In December 1988 the Corps of Engineers honored the Savannah District for its support to engineering and housing at its military installations. Col. Locurcio accepted a plaque recognizing the district as the "best installation support district for 1988" awarded at the worldwide conference of the Directorate of Engineering and Housing held in Baltimore, Maryland.[88]

The Real Estate Division of the Savannah District, including its various field



*Troops training to fight in an urban environment at the Military Operations and Urban Terrain (MOUT) city at Fort Bragg, 1982. (Savannah District, Corps of Engineers)*




*Groundbreaking ceremonies for the new John F. Kennedy Special Warfare Center academic facility at Fort Bragg, October 1989, included (left to right): Brig. Gen David J. Baratto, commander of the center; Col. Ralph V. Locurcio, Savannah District Engineer; Col. Duncan Brown, Director of Engineering and Housing at Fort Bragg; and Chris Wenk, Savannah District's North Carolina area engineer. (Savannah District, Corps of Engineers)*



*A worker applies final wash to C-141 at Robins Air Force Base corrosion and control facility built by the Savannah District. (Savannah District, Corps of Engineers)*



*Dining facility for Robins Air Force Base personnel completed by the Savannah District in 1989. (Savannah District, Corps of Engineers)*



*Troops from Fort Campbell's 101st Airborne Division participate in "SOLID SHIELD," a joint exercise held by the Atlantic Command near Camp Lejeune, NC, on land acquired through the District's maneuver permit program in 1989. (Savannah District, Corps of Engineers)*

offices, continued to carry a heavy responsibility in support of the military mission throughout the three states. These activities included leasing recruiting facilities for the Army, Air Force, Navy and Marines; purchasing and/or selling property at the various installations; managing the 801 Family Housing Program under which private developers design and construct housing units that the government leases for military families; and administering the timber harvesting programs on military lands.

The division continued to acquire access to national forests from the U. S. Forest Service military training exercises as well as permits from private land owners allowing the military forces to use their property. Because the military boundaries of the Savannah District include so many major military installations, the Real Estate Division is responsible for one the largest maneuver permit programs in the Corps of Engineers; moreover, it is one of the most successful ones. In 1989 the Real Estate Division and its North Carolina Real Estate field offices won their second "Excellence in Real Estate" award in a row for their outstanding maneuver permits program.[89] The "SOLID SHIELD" area near Camp Lejune, North Carolina, encompasses approximately 1.9 million acres of land for joint maneuvers every two years by the Atlantic Com-



*"Quick Thrust" exercises at Fort Stewart take place on land acquired through the District's maneuver permit program in Georgia. (Savannah District, Corps of Engineers)*

mand, and the John F. Kennedy Special Warfare Center maneuver area of 4.4 million acres provides land for ongoing training. In all, the Real Estate Division managed almost 6.3 million acres of land in North Carolina for military training purposes. Similarly, it acquired use of private land in Georgia for the annual "Quick Thrust" exercises at Fort Stewart.[90]

In recent years, the Corps of Engineers responsibilities in its military mission went beyond the traditional planning and construction of facilities and the acquisition of land, and the Savannah District shared in this expanded role. For example, in 1989 the U.S. Air Force engaged the district's Military Planning Section to oversee a nation-wide study of Air Force family housing on 27 bases in six major commands. The Housing and Services Division at U. S. Air Force Headquarters made improved family housing on their bases a high priority over the next two to three decades, and it chose the Savannah District to coordinate the contracts and studies to be done by architect-engineer firms. Roberto Castellanos of the Housing and Services Division commented, "We chose the Corps to do this first phase because it is set up to do this type of thing quickly, and we know the high caliber of people in Savannah District."[91] The District also carried out economic analyses and housing market studies for Fort Stewart, Fort Bragg, and Fort Jackson to determine housing availablitiy for military personnel in local communities.

The district also provided cultural resource support to both installations within the district and to the Marine Corps. For example, the Marine Corps Air Station in Beaufort, South Carolina, is the site of potentially valuable archeological resources, and the Savannah District prepared a preservation plan for

that facility. The Marine Corps Recruiting Depot at Parris Island, South Carolina, on the other hand, has several buildings with historical significance, the old home of the commanding general is listed in the National Register. The Savannah District prepared a preservtion plan there as well. Experience gained at Fort Benning and Fort Bragg in this type of historical preservation work provided much of the expertise needed.[92] Projects such as these offered the Savannah District new opportunities for the 1990s.

## MILITARY REAL ESTATE ACTIVITIES*

### MILITARY PROJECTS
### STATE OF GEORGIA
### OCTOBER 1987

Allatoona Recreational Training Area (Ft. Benning)
Fort Benning,
Fort Benning, Wherry Housing
Catoosa Rifle Range
Dobbins Air Force Base
Dobbins AFB Short Approach Landing System
Georgia Air National Guard, McCollum Airport
Georgia Air National Guard, McKinnon Airport
Georgia Air National Guard, Savannah (Southside)
Fort Gillem
Fort Gordon
Fort Gordon Recreational Area (Clarks Hill)
Hunter Army Airfield
Fort McPherson
Moody Air Force Base
Moody Recreational Annex
Robins Air Force Base
Robins Air Force Base Housing Site
Robins Radio Beacon Annex
Savannah Air National Guard Municipal Airport
Fort Stewart
U.S. Army Reserve Center, Athens
U.S. Army Reserve Center, Atlanta
U.S. Army Reserve Center, Atlanta (Chamblee)
U.S. Army Reserve Center, Atlanta (East Point)
U.S. Army Reserve Center, Augusta
U.S. Army Reserve Center, Columbus
U.S. Army Reserve Center, Dublin
U.S. Army Reserve Center, Fort Gillem (Forest Park)
U.S. Army Reserve Center, Macon
U.S. Army Reserve Center, Rome
U.S. Army Reserve Center, Savannah (Southside)
U.S. Army Reserve Center, Tifton
U.S. Army Reserve Center, Fort Valley
U.S. Army Reserve Center, Waycross
Zeigler Place Housing Site

*U.S., Army, Corps of Engineers, *Congressional Fact Book*, (1987).

## MILITARY REAL ESTATE ACTIVITIES*

### MILITARY PROJECTS
### STATE OF SOUTH CAROLINA
### OCTOBER 1987

Aiken Army Airield
Charleston Air Force Base
Charleston Air Force Petroleum Oil Lubricant Retail Distribution Station
Fort Jackson
Fort Jackson Homes Housing Site
McEntire Air National Guard
Myrtle Beach Air Force Base
North Air Force Auxiliary Field
North Charleston Air Force Base
Poinsett Air Force Range
Shaw Air Force Base
U.S. Army Reserve Center, Aiken
U.S. Army Reserve Center, Anderson (E. Whitner St.)
U.S. Army Reserve Center, Anderson, (Fant Street)
U.S. Army Reserve Center, Charleston Army Depot
U.S. Army Reserve Center, Charleston
U.S. Army Reserve Center, Clemson
U.S. Army Reserve Center, Florence
U.S. Army Reserve Center, Greenville
U.S. Army Reserve Center, Greenville (Connecticut Ave.)
U.S. Army Reserve Center, Greenwood
U.S. Army Reserve Center, Orangeburg
U.S. Army Reserve Center, Rock Hill
U.S. Army Reserve Center, Spartanburg
U.S. Army Reserve Center, York
Wateree Recreational Annex

*U.S., Army, Corps of Engineers, *Congressional Fact Book,* (1987).

## MILITARY REAL ESTATE ACTIVITIES*

### MILITARY PROJECTS
### STATE OF NORTH CAROLINA
### OCTOBER 1987

Air National Guard Site, Wadesboro
Armed Forces Examining and Induction Station
Army National Guard Facility, New Hanover County Airport
Asheville-Henderson Airport
Badin Air National Guard
Fort Bragg-Wherry Housing
Cherry Point Air Force Station (Croatan Ground/Air Transmitter-Receiver Facility)
Dare County Range
Elizabeth City Housing Site (Air National Guard)
Fort Bragg-Recreation Center
Fort Fisher Air Force Station
Camp Mackall
Military Ocean Terminal, Sunny Point
Pope Air Force Base
Seymour Johnson Air Force Base
Seymour Johnson, Saulston Annex
Sunny Point Army Terminal Housing Site, Fort Jackson
U.S. Army Reserve Center, Albermarle
U.S. Army Reserve Center, Asheville
U.S. Army Reserve Center, Brevard
U.S. Army Reserve Center, Charlotte
U.S. Army Reserve Center, Durham (2 separate installations)
U.S. Army Reserve Center, Greenville
U.S. Army Reserve Center, Greenboro
U.S. Army Reserve Center, Hickory
U.S. Army Reserve Center, High Point
U.S. Army Reserve Center, Kinston
U.S. Army Reserve Center, Lumberton
U.S. Army Reserve Center, Moorehead City
U.S. Army Reserve Center, Raleigh (2 separate installations)
U.S. Army Reserve Center, Rocky Mount
U.S. Army Reserve Center, Salisbury
U.S. Army Reserve Center, Wilmington
U.S. Army Reserve Center, Wilson
U.S. Army Reserve Center, Winston-Salem (2 separate installations)

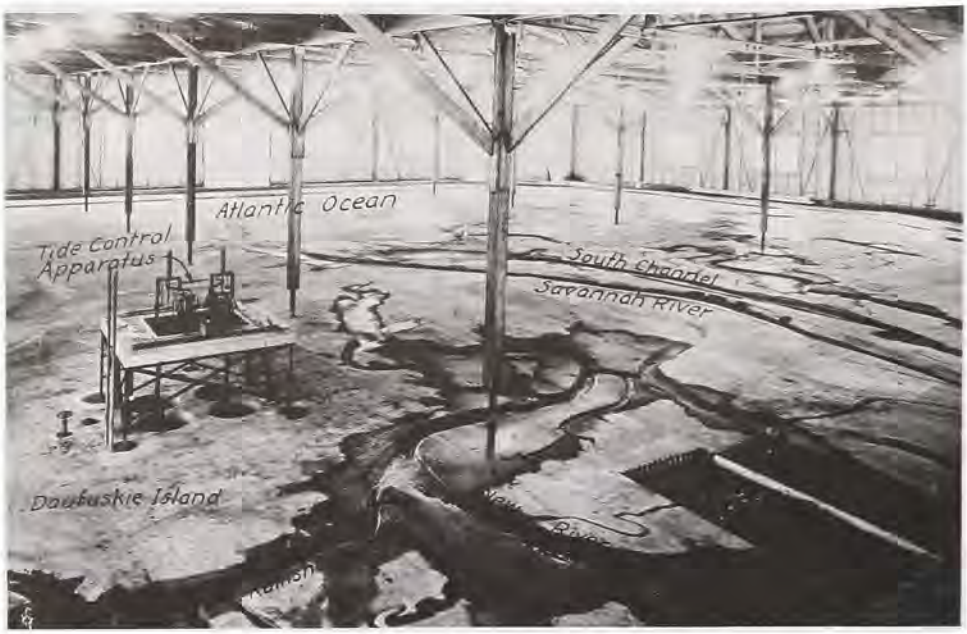
# 13 SAVANNAH HARBOR

With the nation's involvement in World War II, the Savannah District's work on civil projects was altered dramatically. The District was preoccupied with meeting wartime needs; hence navigation improvements and work in the area of flood control were deferred. Between 1941 and 1945 the Corps at times struggled to carry out even the routine maintenance work necessary to keep Savannah Harbor in proper condition. Moreover, Congress failed to act on the 1939 recommendations of the Engineers, and the harbor project stood as completed in 1937. However, planning and design did continue.

When war was declared in 1939, the Savannah Engineers were attempting to reduce maintenance costs by using the tidal flow to help carry sediment and silt brought down by the river on out into the ocean. In earlier years, the Corps had built regulating works such as training walls and wing dams to direct the river's current and help maintain harbor depths. Later the Engineers had relied on dredging to achieve and maintain the project depths, a method that proved to be very expensive. During the 1930s, activities to improve river flow by removing obstacles became the principal tactic used as the Corps dredged the enlarged harbor called for in recent legislation.

As part of the efforts to improve the river's hydraulic conditions as well as test some other ideas for harbor development, in 1940 the Corps of Engineers designed and built a fixed-bed model of Savannah Harbor at the U.S. Waterways Experiment Station at Vicksburg, Mississippi. Lieutenant Colonel Raymond F. Fowler, the Savannah District Engineer, helped prepare construction specifications for the model, which closely duplicated conditions in the harbor and tributary streams from the Atlantic Coastal Highway Bridge (U.S. 17) east to the outer end of the bar channel beyond the 30-foot contour in the ocean, and from the southern end of Hilton Head Island on the north down to and including Wassaw Sound. The horizontal scale was 1 to 1,000 and the vertical scale was 1 to 150; the machinery created a complete tide cycle about every 18 minutes.[1]

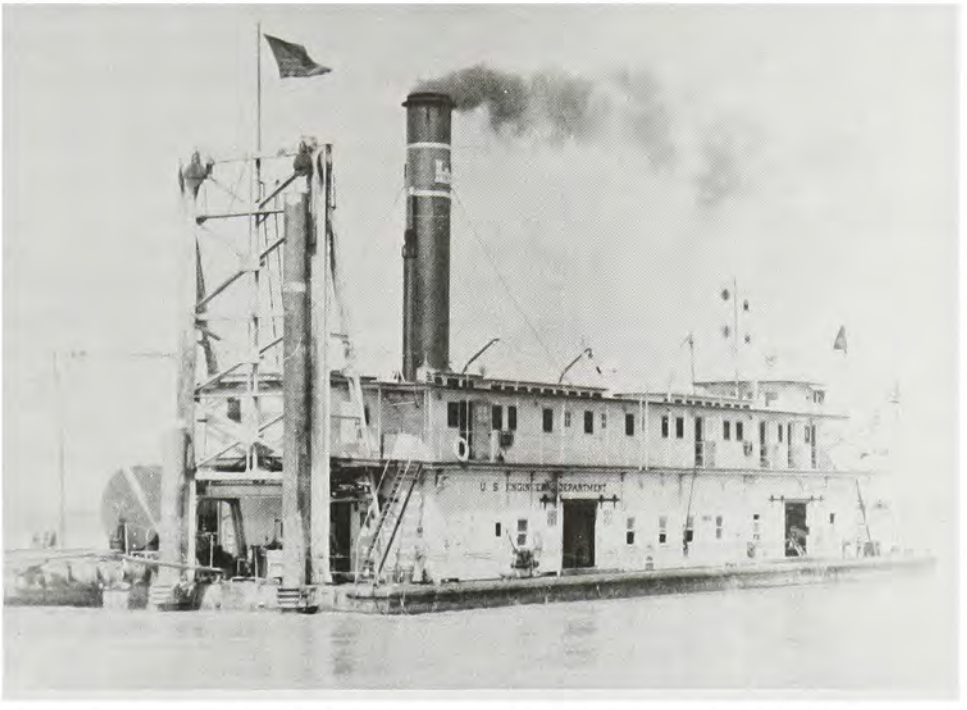
Between April 1940 and June 1946 the Waterways Experiment Station tested the various suggestions for harbor improvements heard in the late 1930s, which included dredging new channels, changing the size and location of existing channels, and constructing structures such as jetties at the harbor's mouth to regulate currents and water volumes passing through the harbor. Ralph F.




*The first model of Savannah Harbor constructed at the U.S. Waterways Experiment Station in Vicksburg, Mississippi, 17 March 1941. The view is toward the southeast. The tide control apparatus which simulated tides in the Atlantic Ocean and Calibogue Sound is in the left foreground. (Savannah District, Corps of Engineers)*

Rhodes, principal Engineer in the District, testified to the model's value in providing engineering information: "Those improvements which the model indicates are efficient, which accomplish the purpose for which they are intended, and which do not produce injurious effects on the remaining portions of the harbor can be designed and located with much more assurance that they will function properly than without the model data."[2]

The Savannah District worked to maintain the harbor with the limited funds available during the war years, but systematic maintenance dredging was impossible.[3] In February 1944 Major Huguenin Thomas, Jr., Acting District Engineer, appealed to the Chief of Engineers for an additional $130,000 to finance the dredging required to supply a sufficient depth to meet the needs of ships using the harbor. According to Thomas, large quantities of Lend-Lease war goods were passing through the port. He said the vessels were loaded to capacity with drafts of 28 to 30 feet, the maximum depth of the harbor project. Thomas proposed that some of the money appropriated for Brunswick Harbor and the Savannah River below Augusta be transferred to Savannah Harbor.[4] In 1945 the District's pipeline dredge *DeWitt Clinton;* the hopper dredge *Culebra;* and the recently acquired pipeline dredge *Pascagoula,* secured from the Mobile District to replace the old *Morgan,* carried out both regular and agitation dredging procedures for maintenance purposes. Built in 1907 and first put into service in Savannah Harbor in 1908, the *Morgan* was considered obsolete because its cutters could not go deep enough for harbor dredging. The vessel had been put out of service in 1940 but recalled in 1942. It was sold to the Gahagan Company, Inc., of New York in August 1946.[5]



*The U.S. pipeline dredge* DeWitt Clinton *used by the Savannah District in Savannah Harbor. (Savannah District, Corps of Engineers)*



*The U.S. hopper dredge* Culebra *used by the Savannah District, in Savannah Harbor (Savannah District, Corps of Engineers)*

By the spring of 1945 Congress began to reconsider the civil works needs of the nation. Among the projects authorized in the Rivers and Harbors Act of that year was modification of the Savannah Harbor in accordance with requests of local interests and the Corps of Engineers recommendations of 1938 and 1939. This included widening the harbor channel in the vicinity of the Atlantic Coast Line Railway terminals from 400 feet to a maximum of 550 feet for a distance of 5,000 feet, deepening the harbor from 26 feet to 30 feet at mean low water above the Seaboard Air Line Railway bridge to its upper limits at the wharf of the Savannah Creosoting Company, and establishing a turning basin across from the Savannah Sugar Refinery Company at the mouth of the Middle River. The legislation, however, stated that no project would be awarded funds or constructed until six months after the end of the war unless it had specific value to national defense and security.[6]

A few weeks later Congress received a new Corps of Engineers report on the harbor, the first since before Pearl Harbor. Actually, the House Committee on Rivers and Harbors had instructed the Engineers to review the project as early as 4 November 1939 and to make recommendations concerning project revisions. This latest report described not only the present condition of the harbor but the changes that had taken place over the years due to Corps of Engineers activities. Notably, the channel between Front and Back Rivers known as Cross Tides, closed off in 1937 by an earth dam, had shoaled considerably. The old submerged dam built across the western end of the South Channel in 1881 and the contraction works built at the junction of the North and South channels in 1893 had deteriorated badly and were ineffective. The training walls built in the North Channel between 1891 and 1894 to contract the width of the channel had all but disappeared. Over the years Elba, Bird, Long, and Cockspur Islands had merged into one long island separating the two channels due to the effects of the contraction devices and deposits of dredged spoil. Oyster Bed Island, on the north side of the North Channel at its mouth, had been created by sand dredged from the waterway and deposited there.[7]

The report also responded to numerous requests from navigation and business interests for project modifications. By now Colonel Clifford T. Hunt, District Engineer, had the results of the testing at the Vicksburg Waterways Experiment Station. Test options had included several designs for jetties on the bar and a relocation of the entrance to the harbor north of the present channel, establishment of a new ship channel via a cut across Elba Island into the unused South Channel, a deepening of the harbor throughout and extending it up to the Atlantic Coastal Highway Bridge, and various plans to continue improving current flows through the channel to help reduce maintenance costs. Colonel Hunt rejected the idea of building jetties or creating a new entrance channel. He also discarded the idea of establishing a ship channel cutoff across Elba Island extending the harbor up to the highway bridge. However, he did recommend enlarging the harbor following the existing channel lines to 36 feet deep and 500 feet wide across the bar to the river's mouth and to 34 feet deep and 400 feet wide in the inner harbor all the way up to a point just above the Mexican Petroleum Refinery, 4,000 feet above the Seaboard Air Line Railway bridge. In addition, Hunt supported the proposal to establish a turning basin at the refinery by widening the channel to 600 feet for a distance of 600 feet, and he

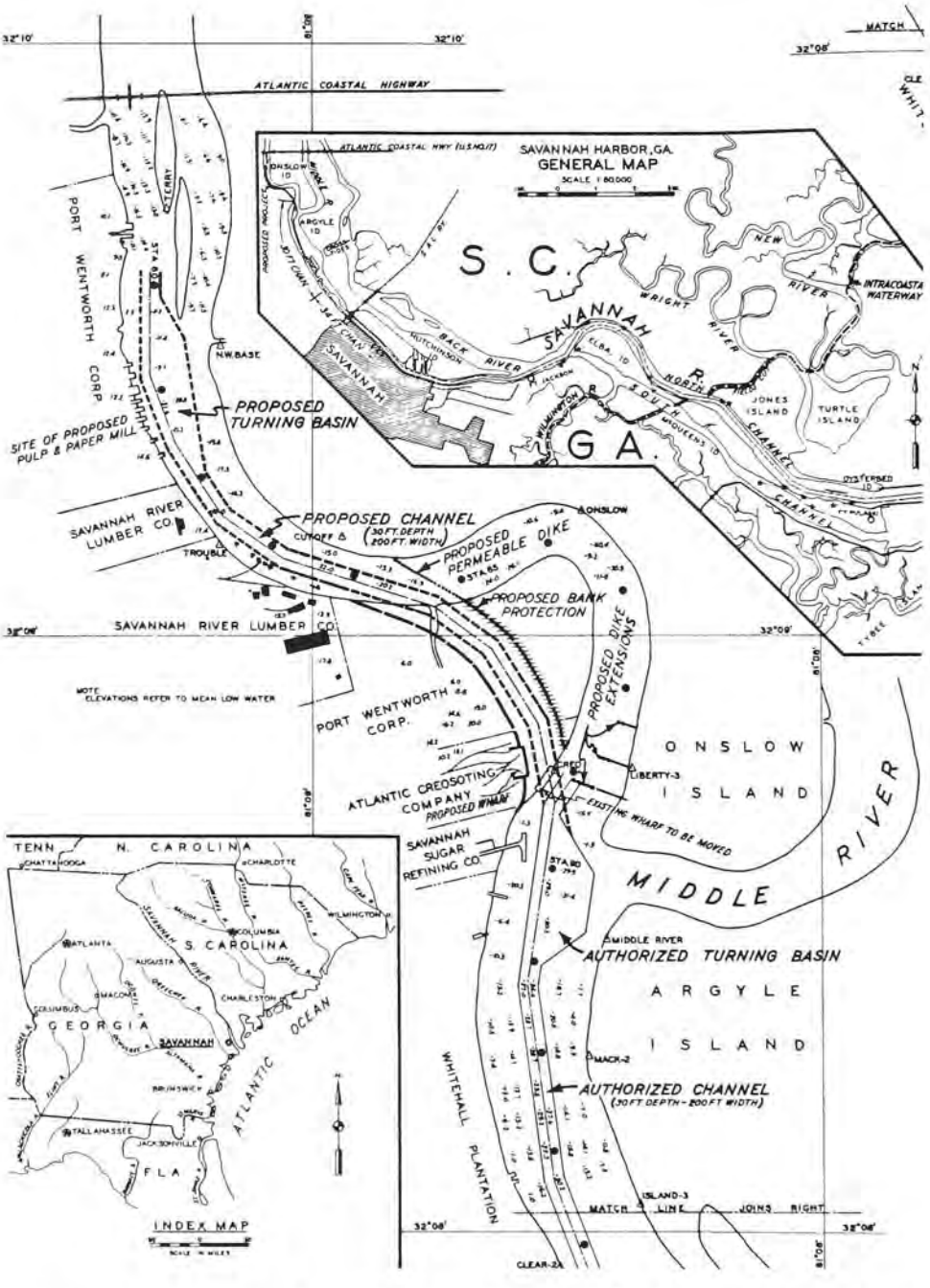
recommended the Corps be authorized to make channel enlargements and diversions as needed when those additions could be paid for with maintenance funds saved by reducing maintenance dredging costs.[8] Congress approved these proposals in November 1945. However, the law stipulated that no funds could be appropriated and no work started for six months after the end of World War II, and the Japanese had surrendered only three months earlier.[9]

While Congress was considering the Corps' recent proposals for harbor modifications in the fall of 1945, the House Rivers and Harbors Committee asked the Engineers to review the project again in terms of extending the harbor up the river as far as the Atlantic Coastal Highway bridge. The District had studied this proposal 20 years earlier, but District Engineer, William F. Tompkins had rejected it, as had his superiors and Congress as well.[10] Local proponents had continued to press for the extension, however. The House committee's request to the Engineers was in response to these local interests.[11]

The chief argument in favor of this extension was that developing the harbor farther upstream was necessary to accommodate new industries. The northern bank of the river all the way to the ocean was marshland as was the south bank below the city, as Colonel Dan Kingman had observed decades earlier. The Robert Gair Company of New York had agreed to locate a large pulp and paper mill just below the highway bridge if an adequate navigation channel were provided.[12] Reacting to the anticipated industrial growth, Colonel Wilson B. Higgins, District Engineer, offered the first report favoring the extension. He conceded that "the proposed channel will probably have to be provided sooner or later, and its provision at this time will bring benefits to industry and the community that much sooner."[13] With support from Higgins, the Board of Engineers for Rivers and Harbors and the Chief of Engineers, Congress in July 1946 authorized a modification of the Savannah Harbor project to include a channel 30 feet deep and 200 feet wide from the Atlantic (formerly Savannah) Creosoting Company wharf to a point 1,500 feet below the Atlantic Coastal Highway Bridge, a distance of 1.45 miles, and a turning basin at the upper end 600 feet wide. The plan also included dredging a cutoff just above the Atlantic Creosoting Company to remove a major bend in the river.[14]

This latest legislation included no restrictions regarding military needs or national defense and no waiting periods before work could get under way. One final detail to be worked out related to the Seaboard Air Line Railway bridge. Built in 1902, this bridge was an important landmark over the years in terms of project development and was in fact the only bridge across the harbor. It was described as a "steel-girder and steel-truss structure on masonry piers, with a rolling-lift drawspan with a horizontal clearance of 116 feet between fenders." With the drawspan closed, the vertical clearance was only 16.4 feet at low water.[15] As Savannah Harbor continued to grow both in length and depth and the ships using it increased in size, the bridge became a hazard to commerce in the upper reaches of the port.

Part of the Corps of Engineers' long-standing authority to regulate navigable waters included control over bridges, and as early as 1937 the War Department had approved plans for a larger bridge and ordered the railway company to carry them out. However, the war had prevented the work. On 23 February 1946 the Secretary of War again ordered the bridge owners to remodel the structure,




*Map showing the proposed modifications of Savannah Harbor recommended by the Corps of Engineers and authorized by Congress in July 1946. (H. Doc. No. 678, 79th Cong., 2d Sess.)*

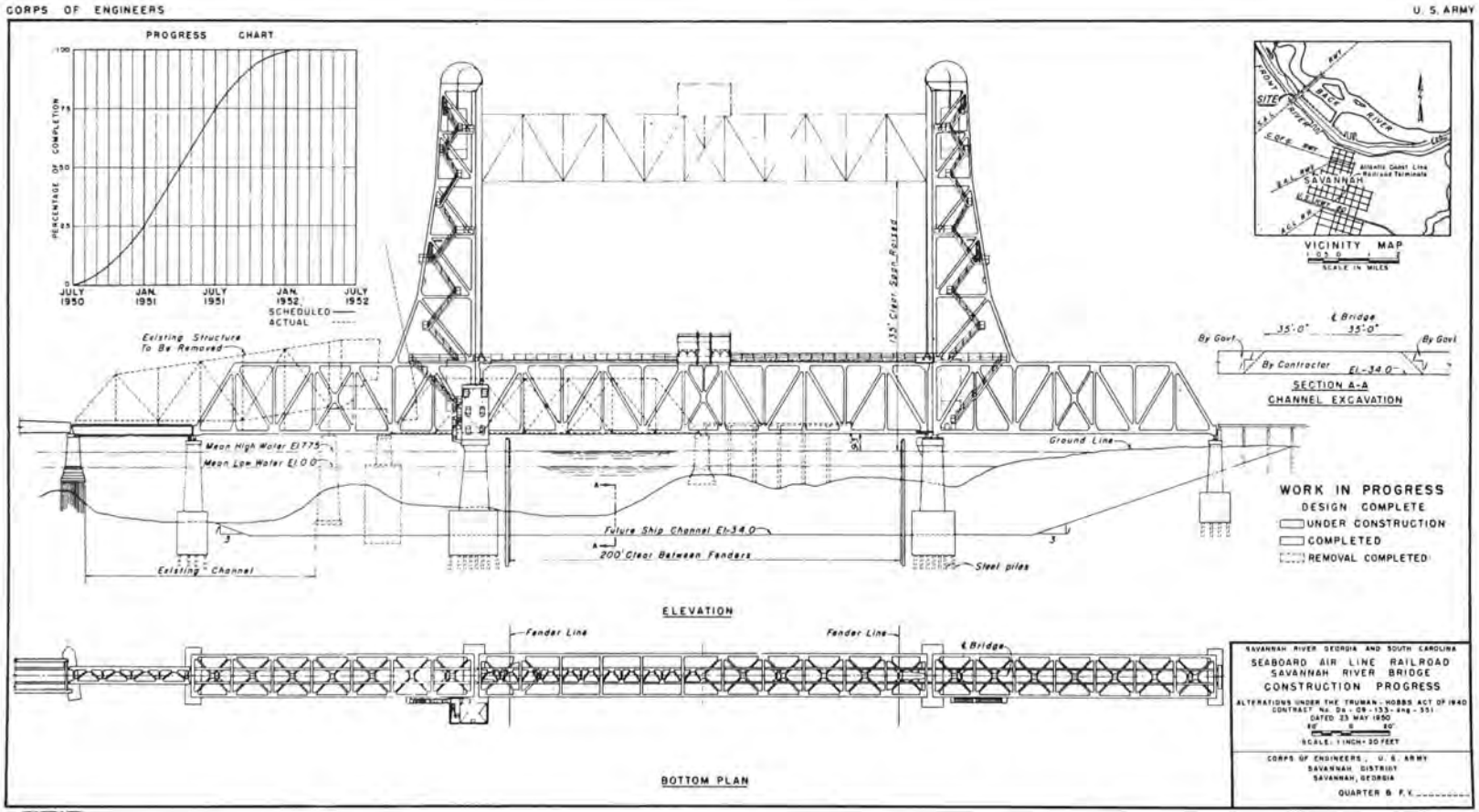


*Aerial view of the Seaboard Air Line Railroad Bridge in July 1960 as seen from the South Carolina side of the Savannah River. (Savannah District, Corps of Engineers)*

speaking this time under the authority of the 1940 Truman-Hobbs Act, which permitted the U.S. Government to assume some of the costs of altering bridges over navigable waters. The new plans, which the Corps helped draw up, provided for a bridge with a 200-foot horizontal clearance and a 135-foot vertical clearance at mean high water. Moreover, the plan required shifting the main harbor channel several feet northward.[16]

The stage was set for major new activity in Savannah Harbor. The preparation and planning of the war years and after could be implemented. New work in the harbor dominated the District's attention as the Engineers sought to achieve the project dimensions as provided for in recent legislation. Gradually, the expanded harbor took shape. On 5 February 1948 the extension up to the highway bridge at a depth of 30 feet was completed, including the cutoff of the bend just above the mouth of the Middle River near the Atlantic Creosoting Company. The 34-foot channel was achieved by 20 May 1949 except for a short section above and below the Seaboard Air Line Railway bridge, where dredging of the new channel could not be done until the bridge alterations were completed. The 36-foot bar channel was finished in mid-April 1951.[17] The new work on the bar was carried out by the U.S. hopper dredge *Culebra* and its later replacement, the larger U.S. hopper dredge *Gerig.* New work in the upper regions of the harbor, however, was done under contract by the Atlantic, Gulf and Pacific Company using its dredge the *Baltimore.*

Maintenance dredging, usually done by government plant, consumed a great




*Plans for modification of the Seaboard AirLine Railroad Bridge at Savannah Harbor as of 23 May 1950 under provisions of the Truman-Hobbs Act of 1940. Note the expanded width of the ship channel and its shift to the right. (Savannah District, Corps of Engineers)*

deal of time and funds. After all, the Savannah Engineers had to maintain existing channels at present project depths even as the new work was under way. The U.S. pipeline dredges *De Witt Clinton, Pascagoula,* and *Henry Bacon* were frequent sights in the upper sections of the harbor as they battled the shoaling and sediment problems so long associated with this harbor. The *Baltimore* and a sister dredge *Admiral* also did some maintenance work when not engaged in new project dredging, as did the *Gerig* out on the bar.[18] Although such mainte-



*The U.S. hopper dredge* Gerig *which replaced the older and smaller* Culebra *in the Savannah District. (Savannah District, Corps of Engineers)*



*The U.S. pipeline dredge* Henry Bacon *assigned to the Savannah District in 1947. (Savannah District, Corps of Engineers)*

nance dredging was needed throughout the full length of the harbor, the most serious shoaling was found in the four miles of the Front River above its intersection with the Back River near Fort Jackson. There the silt-laden fresh waters of the river encountered the salt water moving upstream during flood tide. The interaction of the two turned the silt to slush, which required dredging to remove. The outer bar section was the second most troublesome part due to the shoaling that resulted from the action of waves and littoral currents.[19]

The problems of maintaining and expanding Savannah Harbor were not limited to those imposed by nature. The postwar activity was costly, and the Savannah District frequently complained that Congress was not allocating enough funds each year to achieve the project goals. The Corps was compelled to shift monies designated for other projects in the District to Savannah Harbor, testimony to the District's commitment to that harbor and to the waning importance of other projects. For example, in January 1947 $30,000 provided under the War Department Civil Appropriations Act of 1946 for the Savannah River below Augusta and for maintenance of the Oconee, Ocmulgee, and Altamaha Rivers; Brunswick Harbor; the Satilla River; and the St. Marys River was reallocated to Savannah Harbor.[20] Similar actions occurred several times during the late 1940s and early 1950s as other projects had to yield to the harbor at Savannah.

During the Korean War era, reconstruction of the Seaboard Air Line Railway bridge finally began. Two engineering firms did the design and construction work under contract. As previously noted, the 1946 law also called for realigning and deepening the harbor channel to 34 feet in the immediate vicinity of the bridge, and this part of the project was also carried out by contract. The dredges *Baltimore* and *Admiral* belonging to the Atlantic, Gulf and Pacific Company, completed the work in 1953, thus achieving the project as provided for in the 1945 and 1946 Rivers and Harbors Acts except for construction of a few pile dikes and bank revetments near the upper end of the harbor. The Savannah Harbor project now included the following:

- A channel 36 feet deep and 500 feet wide across the bar for a distance of 9.7 miles
- A channel 34 feet deep and 400 feet wide, increasing to 550 feet wide in the section opposite the Atlantic Coast Line terminals, to the vicinity of the Mexican Petroleum Corporation, a distance of 17.2 miles
- A turning basin 34 feet deep opposite the petroleum company terminals
- A channel 30 feet deep and 300 feet wide up to the foot of Kings Island, a distance of 0.6 miles
- A channel 30 feet deep and 200 feet wide to the Savannah Sugar Refining Corporation
- A turning basin 30 feet deep opposite the sugar refinery, a distance of 2.1 miles
- A channel 30 feet deep and 200 feet wide to a point 1,500 feet below the Atlantic Coastal Highway bridge, a distance of 1.4 miles
- A turning basin 30 feet deep at the upper end of the harbor

The harbor project was now 31 miles long.[21]

Throughout the decades of improvement to Savannah Harbor, one fact had remained constant; even as the Savannah District carried out projects autho-

rized by Congress, the groundwork was being laid for new legislation to modify the existing project and to further enlarge the harbor. The same was true in the early 1950s. In 1948 the Georgia Ports Authority (GPA), a State agency chartered three years earlier by the Georgia General Assembly to develop the State's seaports and to construct and operate port facilities, purchased the former World War II Quartermaster Depot on the Savannah River opposite Kings Island. Construction of the Savannah State Docks and Warehouses, better known as the Garden City Terminal, began in the spring of 1951, and the GPA facilities began operations in 1952. The authority and other interested parties called on Congress to provide for enlarging the harbor as far as the site of the new terminal.

Specifically, the request proposed that the existing 30-foot channel above the Mexican Petroleum Corporation be deepened to 34 feet for a distance of 1.6 miles upstream and that a turning basin 34 feet deep, 700 feet wide, and 1,000 feet long be constructed between Kings Island and Argyle Island at the old Cross Tides entrance. Advocates argued that the present channel was inadequate for the larger vessels anticipated. The new turning basin was particularly important in that its dimensions would accommodate the large T-2 tankers, which were 523 feet long, and the "Mariner" class dry cargo ships, which were 560 feet long. Large vessels headed for the State port docks at that time had to



*The upper section of Savannah Harbor showing the Georgia Ports Authority's Garden City Terminal in the center, the GPA's Container Central Terminal above that, and the GPA's Bulk Handling Facility above that. Note the Kings Island Turning Basin opposite the Container Central Facility. (Savannah District, Corps of Engineers)*

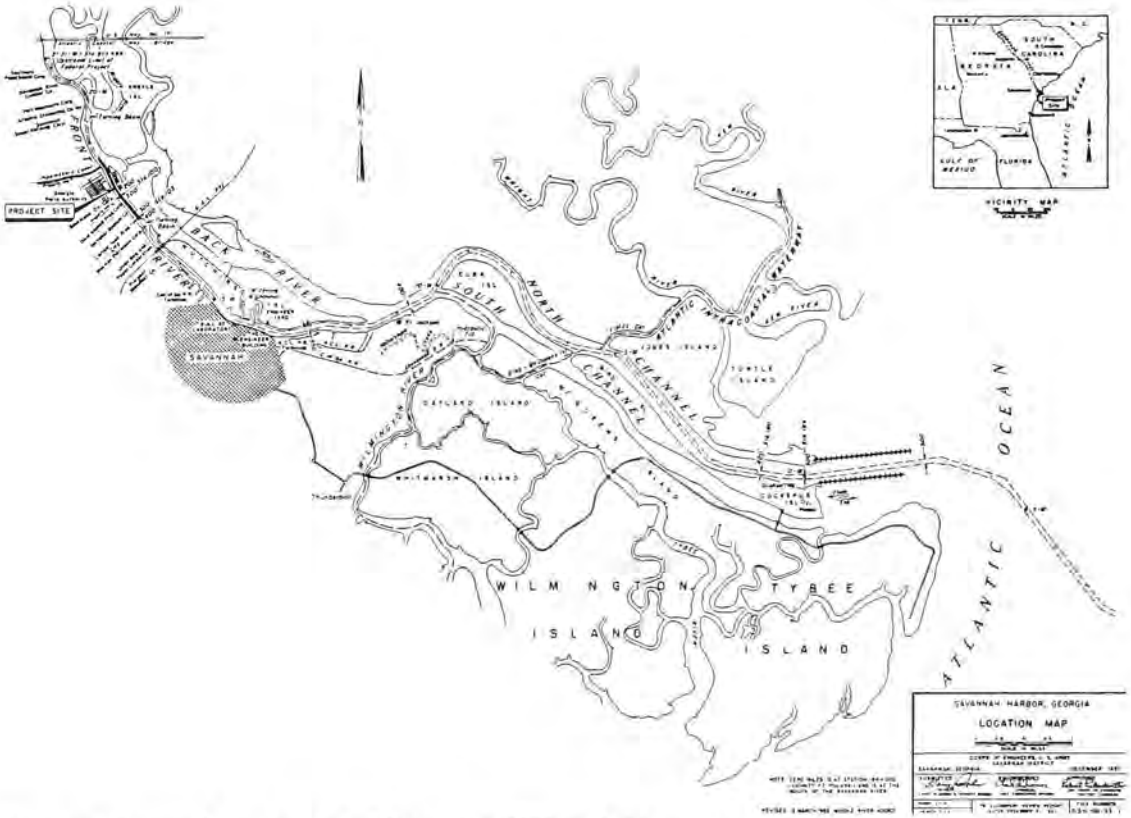


*The Southland Corporation's tanker* Texas Trader *discharging its cargo at Savannah Harbor, 14 November 1960. (Savannah District, Corps of Engineers)*

be turned around well downstream and moved upriver stern first, or had to be moved downstream stern first before being swung around in the closest turning basin. Military needs as well as commercial benefits were cited in justifying the new project in that tankers brought fuel for the U.S. Air Force to this facility for land shipment to bases in North and South Carolina, Georgia, and Florida.[22]

The House Committee on Public Works requested a new study of the harbor in light of these requests, and Colonel Robert Erlenkotter, District Engineer, responded favorably: "This improvement is a logical step in the development of the harbor for deep-draft vessels." He added that the Federal Government was fully justified in undertaking the project. Erlenkotter recommended deepening the harbor to 34 feet with a width of 400 feet from the Mexican Petroleum Corporation wharf to a point just above the GPA's terminal. He also recommended construction of the Kings Island Turning Basin, but reduced the size to 600 feet wide and 700 feet long. Congress subsequently authorized these improvements in the Rivers and Harbors Act of 1954.[23]

New work under the 1954 authorization did not begin for several years. The Corps finally approved plans for the new 34-foot extension and advertised for contract bids. However, on three different occasions the low bid was too high. Eventually, the Hill Dredging Company, using its dredge *Ventnor* completed the project in December 1958.[24]




*Map showing Savannah Harbor as of December 1951 and the project modifications as recommended by the Corps of Engineers and approved by Congress in September 1954, including deepening the harbor to 34 feet and widening it to 400 feet from the Mexican Petroleum Corporation to a point just above the Georgia Ports Authority's Garden City Terminal and construction of the Kings Island Turning Basin. (H. Doc. 110, 83d Cong., 1st Sess.)*



*The U.S. pipeline dredge* Henry Bacon *at work in Savannah Harbor in the early 1950s. Notice the long pipeline leading to spoil sites on Hutchinson Island. (Savannah District, Corps of Engineers)*

In the meantime the Corps continued its maintenance dredging except for a brief period in 1956. The *Henry Bacon,* which had been assigned to the Savannah District in June 1947 and since that time had been used for harbor maintenance dredging, suddenly was moved to the Wilmington District, leaving Savannah Harbor with no government dredge. The Chief of Engineers' Office assured Savannah District officials that contract dredges could deal with the continuous shoaling problem. However, the two firms that bid for the job later declared that their dredges could not begin maintenance operations for four months. Bar pilots and ship masters began to complain of shoals in the channel, supporting local charges that the harbor needed constant dredging rather than spot dredging by contract. The hopper dredge *Gerig,* a seagoing dredge that normally worked on the bar, was brought briefly into the inner harbor for emergency dredging along the city front. Local interests protested, stating that a hopper dredge was slower and more expensive to use than a pipeline dredge. A hopper dredge had to carry its dredged spoil out to sea while a vessel such as the *Henry Bacon* piped the sand and mud to spoil sites along the riverbank. Finally, the U.S. pipeline dredge *Gillespie,* somewhat smaller than the *Bacon* and retired to Philadelphia, was reactivated and used for maintenance dredging by the Savannah District.[25] Contract dredges also were used occasionally.

Savannah Harbor proponents considered the Kings Island Turning Basin, as specified in the 1954 legislation, inadequate to accommodate the increased size of ships expected to use the GPA's Garden City Terminal. Thus, local interests sought congressional support for new Corps studies related to enlarging the basin. This request came from the Senate Committee on Public Works in December 1958 just as the Savannah District was completing the 1954 project modifications. The Savannah Engineers performed the study, and Lieutenant

Colonel Arthur T. Strickland, Acting District Engineer, submitted the report.

Strickland recommended that the Kings Island Turning Basin be enlarged to 900 feet wide, 1,000 feet long, and 34 feet deep. He cited the economic justification for the expansion. The report echoed the claims of local interests who asserted that ships of 26-foot draft or better had to be turned during flood tide and slack water. Because the tidal cycles are repeated only every 12 hours, and ships could be unloaded and ready to leave the harbor in 1 to 6 hours, shipping companies were losing time and money. Moreover, the number of ships facing this situation was increasing. In fact, some ships were bypassing Savannah Harbor. The harbor thus stood to lose business and money unless this proposed project was approved and carried out.[26] The Division Engineer and the Board of Engineers for Rivers and Harbors endorsed Strickland's recommendation, and Congress authorized construction in the 1962 Rivers and Harbors Act. After District personnel prepared plans and specifications, a contract for dredging was awarded. The project was completed in March 1965.[27]

The Savannah Harbor commanded much of the Corps of Engineers' attention in the first half of the 1960s. Increases in commercial traffic had given rise to efforts to enlarge the harbor, and repeatedly Congress required new studies and authorized project modifications that the Savannah District carried out. Even after the Engineers became involved in dam construction and other such activities, Savannah Harbor remained one of the District's most important projects.

Between 1930 and 1960, the annual cost of maintaining Savannah Harbor had risen from almost $400,000 to just under $1.5 million. The burgeoning cost was due in large part to the fact that shoaling had increased with each improvement completed in the harbor. Moreover, the concentration of shoaling had crept upstream each time the harbor had been deepened.[28] Although the District had used various methods in dealing with the shoaling problem, maintenance dredging was still considered the most effective solution. The U.S. pipeline dredge *Henry Bacon* was seen for months at a time dredging in various parts of the harbor; the government hopper dredge *Gerig* and the hopper dredges *Hyde* and *Comber* also were used on occasion. The Corps contracted for dredging as well.[29]

As always, disposing of spoil was a problem, particularly as more and more land adjacent to the harbor was being privately developed. In the past, the Corps had dumped the spoil into designated areas only to have much of it run back into the channels. By the 1950s shoaling had become most concentrated in Front River opposite Savannah, and spoil areas close by were nearly depleted. The Engineers then began to construct dikes to contain the spoil.[30]

By 1960, Savannah provided two new spoil areas for maintenance work in Front River. They were located north of Back River between U.S. Highway 17A and the midpoint of Bight Channel downstream. In January 1962 the Corps approved a plan for dike construction at these sites, and the work was done by contractors over the next three years. The new spoil sites, however, presented a challenge to the District because they were so distant from the actual dredging operations of the *Henry Bacon* in the Front River section of the harbor. At times the pipelines exceeded 10,000 feet in length. In 1963 and 1964 the District built permanent pipelines across Hutchinson Island, which connected to pon-



*The Georgia Ports Authority's Ocean Terminal, Savannah Harbor. (Savannah District, Corps of Engineers)*

toon pipelines across Back River and carried the spoil to the new disposal sites.[31] At this same time new dredging techniques were used to minimize agitation of the silt. District personnel had concluded that stirring up the sediment only caused it to settle in other parts of the harbor. To reduce agitation, dredges were operated with a slow cutter speed and adjusted swing speed.[32]

At this same time, the Savannah Engineers were studying further expansion of Savannah Harbor. As always, local interests, including the GPA, were eager to increase the traffic using the harbor. The GPA had expanded its own terminal facility in January 1958 by purchasing the docks of the Central of Georgia Railroad and its subsidiary, the Ocean Steamship Company, located just above the city center. The new acquisition became the GPA's Ocean Terminals. Indeed, Corps of Engineers statistics showed that trade through the harbor increased during the 1950s.[33] The *Savannah News-Press* stated in 1958, "The bustling industries of the waterfront, the ships that sail into the harbor from the farflung corners of the world, the statistics of shipping, exports and imports, all add up to make Savannah one of the outstanding ports of the Southeast...."[34]

The increasing size of the ships was another factor in calling for deepening the harbor. Safety also had to be considered; the present harbor widths jeopardized the safe passage of the larger ships in the harbor. Local citizens also pointed out that the sharp bend in Bight Channel threatened the movement of the larger ships through this section of the harbor. They proposed creating a

new channel cut through Elba Island into North Channel, thus eliminating the Bight Channel and shortening the harbor.[35]

In the fall of 1959 the House Public Works Committee called on the Corps to restudy the harbor project in light of these concerns and requests. Savannah District Engineer, Colonel Jack R. Harris submitted the report in June 1962. He recommended many of the suggested changes including deepening the channel across the bar to 40 feet, the harbor between the bar channel and Garden City Terminal to 38 feet, and the harbor between the Garden City Terminal to the Savannah Sugar Refining Corporation to 36 feet. He also recommended widening the harbor to 600 feet in the bar channel, to 500 feet between Fort Pulaski and the Atlantic Coast Line Terminal, and to 400 feet between Garden City Terminal and the Savannah Sugar Refining Corporation. Acknowledging the need for larger turning basins, Harris's report proposed enlarging the existing Marsh Island turning basin adjacent to the American Oil Company to 900 feet wide by 1,000 feet long by 34 feet deep and constructing a new turning basin opposite the Atlantic Coast Line Terminal, later known as the Fig Island turning basin, with dimensions of 900 feet wide by 1,000 feet long by 34 feet deep. The District Engineer gave the project a benefit-cost ratio of 1.3 to 1.0. Because the proposed cut across Elba Island did not meet the benefit-cost test, Colonel Harris proposed only "providing necessary wideners at the bends" in response to the Bight Channel problems.[36]

As this interim report was released, the Corps of Engineers was studying ways to reduce annual maintenance costs in Savannah Harbor. The Corps' recommendations regarding project modifications would have to be included in a final report.[37] And as the District battled the shoaling problem locally, the Waterways Experiment Station (WES) in Vicksburg was investigating how to cope more effectively with this perennial problem.

Because of increased shoaling after the harbor was deepened to 34 feet in 1947 and 1949, the Office of the Chief of Engineers directed in April 1949 that a new model of the Savannah Harbor be constructed and new tests run. The project was entitled "The Savannah Harbor Investigation and Model Study." After several years of planning and verification studies done in the harbor, the model was completed in 1956. Housed in a hangar, it covered 25,000 square feet and was constructed on a horizontal scale of 1:800 and a vertical scale of 1:80. This elaborate structure reproduced in detail approximately 413 square miles of territory from Hilton Head Island south to Wassaw Sound and from well offshore in the Atlantic upriver to the head of tidewater of Ebenezer Landing, a distance of 50 miles. The model simulated river currents, shoaling, and salinity conditions. Colonel Thomas DeF. Rogers, District Engineer, referred to the model as a "thinking machine."[38]

The WES conducted the tests between June 1956 and January 1959. The purpose was to determine ways to either reduce shoaling or to cause it to occur in places where sediment could be removed easily and inexpensively. The Engineers also sought ways of improving navigation that would also cut down on maintenance costs. Testing focused on three solutions. One called for diverting the fresh water of the Savannah River away from Front River, where shoaling was most serious and spoil disposal was most expensive, through Back River or some specially constructed channel to a tidal river and the ocean north of the

harbor. This approach was ruled out because of pollution and freshwater shortage problems. Another idea called for realigning the harbor channel through the lower harbor's South Channel and the cut across Elba Island into the North Channel, thus eliminating the Bight Channel. Local interests endorsed this idea, and it also offered the possibility of building diversionary structures across Bight Channel to trap and retain sediment. It was rejected, however, as not having enough effect on shoaling in the upper harbor. The third technique involved constructing a sediment basin designed "to attain the maximum possible rate of shoaling" and located near spoil disposal sites.[39]

WES engineers favored the third idea and recommended constructing a sediment basin in Back River 600 feet wide, 40 feet deep, and approximately two miles long with an entrance channel 34 feet deep and 300 feet wide. The plan called for closing off the west end of the basin with an earth-filled dam and a tide gate 1,162 feet long, which would open to allow the incoming tide to pass through the sediment basin but shut automatically during ebb tide. The plan also proposed cutting a drainage canal across Argyle Island 300 feet wide and 15 feet deep to connect Back River and Middle River upstream from the basin. This would increase the ebb flow through Front River because it is connected with Middle River. Obviously, the plan would not eliminate the shoaling problem, but the overall effect would be to trap sediment in the basin that normally would collect in Front River. The sediment then could be dredged economically from the basin and deposited in nearby spoil areas.[40]

While the technical side of Savannah Harbor model tests was handled by the WES, the Savannah District evaluated the techniques tested according to their benefit-cost ratios. While the Back River sediment trap and tide gate plan ranked second in economic advantages, when all factors were considered this option was the plan recommended by the Corps.[41] After the District Engineer proposed enlarging the harbor in 1962, the WES did further studies of the shoaling problem using a model with the increased harbor dimensions. The data again pointed to the Back River sediment basin and tide gate as the most effective solution, although the WES also suggested a deeper entrance channel into the basin (38 to 40 feet deep) to conform with the deeper harbor. The additional tests, however, showed that this plan with its canal across Argyle Island plus the deeper harbor would lower the water level and create higher salinity concentrations in the Middle and Little Back Rivers near the Savannah National Wildlife Refuge and thus jeopardize the work of the U.S. Fish and Wildlife Service there. This refuge had been established in 1931 and was a major nesting and feeding area for thousands of waterfowl, especially the wood duck. To combat the problem, the Engineers devised a scheme to divert fresh water from the Savannah River upstream from the harbor into Middle and Little Back Rivers through a passage called McCombs Cut. They also proposed constructing a series of canals around and within the wildlife refuge to distribute this water and thereby protect its quality.[42]

In October 1964 Colonel Paul W. Ramee, the Savannah District Engineer, reported favorably on the sediment basin and tide gate plan as developed and tested. He also cited a 1.5 to 1.0 benefit-cost ratio.[43] His report encompassed all aspects of the review of Savannah Harbor that Congress had called for in 1959. The recommendations for a deeper and wider harbor, expansion of turning



*Aerial view of Savannah Harbor with the historic harbor section known as Factor's Walk along the Front River. The Savannah District's Hutchinson Island Depot, formerly called the Engineer Yard, is seen across Front River at center right, and the Fig Island Turning Basin is seen in the upper right hand corner. Above Hutchinson Island is Back River, and beyond it lies South Carolina. (Savannah District, Corps of Engineers)*

basin facilities, and the sediment basin plan were submitted to Congress in August 1965. Congress included these project modifications in the Rivers and Harbors Act of 1965.[44]

The Savannah District prepared to implement the tasks laid before them. The harbor expansion was divided into three phases. The first phase included widening and deepening the channel between the Seaboard Coast Line Terminal and Fort Pulaski on Cockspur Island; that is, the lower section of the project. This phase also included construction of the Fig Island turning basin opposite the Atlantic Coast Line Terminal. The District contracted this work to the Potasknick Dredging Company of Fort Lauderdale, Florida. The company worked on the project between September 1967 and March 1969.[45] The second phase focused on improving the upper harbor between the Seaboard Coast Line Terminal and the Savannah Sugar Refinery and included expanding the Marsh Island turning basin. It too was accomplished by contract and was finished in June 1971.[46] The third phase enlarged the channel from Fort Pulaski out across the bar. This work was the most time-consuming and was not completed until 1978. Government plant carried out most of the third phase; the U.S. hopper dredge *Goethals* did most of the work assisted by the U.S. hopper dredge *Essayons* and the contract pipeline dredge *Manhattan Island*.[47]



*The Savannah Harbor Tide Gate across Back River and Sediment Basin beyond under construction in the early 1970s. Note the pipeline dredge in operation in the foreground. (Savannah District, Corps of Engineers)*

At the same time the District was busy with the sediment basin construction project. The initial steps in this project's development had been taken in 1949 with the order to build the new harbor model in Vicksburg and to study ways to control shoaling. It would prove to be one of the most prolonged and dramatic Corps improvements in the history of the Savannah Harbor project. Following authorization in 1965 the District spent the next few years drawing up designs, plans, and specifications for all aspects of the work. Dredging of the sediment basin began in 1970 and went on for several years. Dredging of the canal across Argyle Island was finished in August 1972 as was construction of earth-fill dikes between which the tide gates structure would be built across Back River. Work on the tide gates structure itself began in 1972. It was planned to have 14 gates on a 903-foot-long concrete spillway between the dikes. Meanwhile, contracts were let for building the freshwater canals and diversion channels for the wildlife refuge in 1973 and 1974.[48]

This project was near completion by the end of 1974. However, disaster struck the tide gates shortly after they were lowered into the water in October 1974. As designed and built, the gates were attached to a hydraulic mechanism that was to open and close them according to the natural timetable of tide changes in the river. However, the action of the tides is affected by more than just the tidal flow according to the usual schedule, and therefore the first time an unusually strong tide and high winds occurred together, the cables used to

control the gates broke. Two of the gates were badly bent and another was slightly damaged. The entire tide gates structure had to be lifted out of the water, and repairs and design modifications cost more than $900,000. The District bore the larger share of the expense, more than $700,000, while the subcontractor, Steel Erectors Incorporated of Savannah, paid the balance. The new design provided for heavier cables and gates that were free to swing with the tides.[49] The tide gates structure finally went back into operation on 16 May 1977.[50]

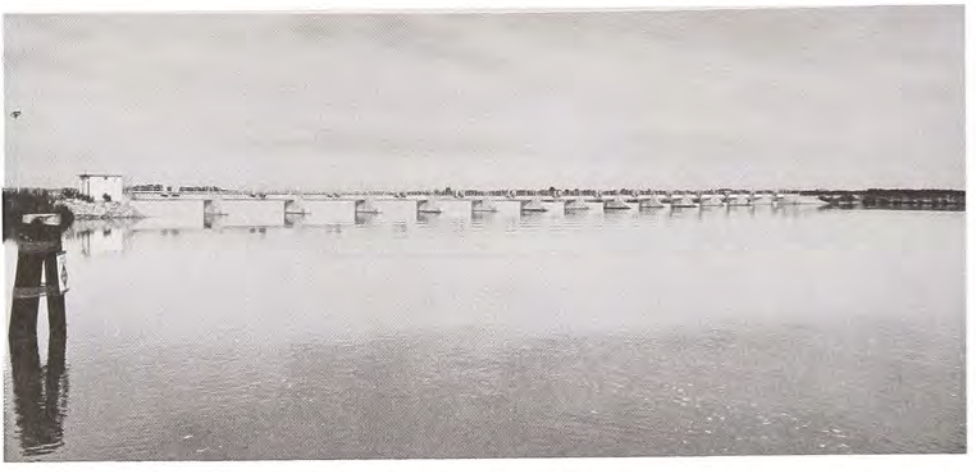
More than 28 years had elapsed since the WES studies of the Savannah Harbor shoaling problem. However, after the project was completed, the Savannah District reported year after year that the increased ebb tide directed through Front River by the closing of the tide gates, plus the diverting of sediment into the basin rather than Front River, "reduced annual maintenance costs while increasing the dependable channel depths."[51]

Of note is the fact that after almost 30 years of studying and applying scientific principles of hydraulic technology, the District accomplished the results anticipated in the 1827 report on harbor improvements. This success had been achieved through essentially the same scheme as that proposed in the 1827 report. In that first report on harbor improvements, the Savannah agent recommended that dredging should be accompanied by the construction of a dam across Back River that would divert an additional flow of current into Front River and thereby provide a scouring and flushing action in the harbor. The tide gates accomplished this objective.

A second catastrophe hit the District in 1975. Between 2:00 and 3:00 AM on 29 December, the pipeline dredge *Henry Bacon* sank in 36 feet of water in Savannah Harbor at the Engineer Depot dock on Hutchinson Island. Two tender boats, the *Jenkins* and the *Jupiter,* which were used to maneuver the nonpropelled dredge and were tied to it at the time, sank also. The *Henry Bacon* had been a familiar sight in Savannah Harbor since World War II. Originally belonging to the Wilmington District, it had been used in the Pacific Islands during the war.[52] After the war it was transferred to the Savannah District and used almost exclusively in Savannah Harbor, Brunswick Harbor, or along the Georgia section of the Intracoastal Waterway. In service outside the District, it dredged a deep-water harbor at Ernest Harmon Air Force Base in Newfoundland in 1952 and 1953. At the time of the sinking, it was the only government-owned pipeline dredge on the Atlantic Coast. A board of investigation was unable to determine the cause of the sinking. One District spokesman commented that it was not unusual for dredges to sink without apparent reason because they float so close to the water line and can take on water easily.[53]

The *Bacon*'s sinking was more than just an economic or operational loss to the District. It posed a serious threat to ships moving through the harbor adjacent to the Engineer Depot. The Corps warned all ships entering the harbor to take extreme caution in the area.[54] The District raised the *Jenkins* and the *Jupiter* within a few days of their sinking, but the *Bacon* presented a challenge.

The Engineers first had to decide whether to try to raise the dredge intact or to remove it piecemeal as scrap. Divers reported that the vessel was fundamentally sound, with no cracks or holes in its hull. The District decided to raise the dredge intact. After considering several solutions, the Engineers decided to use



*The Tide Gate across Back River. The project was finally completed in 1977. (Savannah District, Corps of Engineers)*



*The U.S. pipeline dredge* Henry Bacon *after it sank into 36 feet of water at the Engineer Depot Dock on Hutchinson Island on 29 December 1975. (Savannah District, Corps of Engineers)*

a *DeLong* barge such as those used to salvage sunken vessels during the Vietnam War. A *DeLong* barge was brought from Fort Eustis, Virginia, and prepared for the project with assistance from members of the U.S. Army Transportation Corps headquartered there.

The *DeLong* barge, more correctly called a *DeLong* pier *"jack-up"* barge, was 300 feet long and 80 feet wide. It stood on 10 legs, each 130 feet long. With

its legs reaching into the air, the barge was maneuvered into position straddling the *Bacon*. Divers and cranes looped slings of wire rope under the dredge. The slings were then attached to the barge. Gradually, the barge was jacked up on its huge legs, now planted on the river bottom. In a "belly-lift" operation, the *Bacon* was raised in its wire sling cradle beneath the *DeLong* barge in March 1976.[55] This was the first time this technique had been used in the United States to salvage a sunken vessel. The event was "history-making," according to a local newspaper.[56]

Although the vessel's soundness was preserved, the *Henry Bacon* would not be returned to Corps of Engineers service. The dredge had been scheduled for drydocking in April 1976 for extensive repairs and renovation.[57] The ship's unexpected sinking and the prospect of even more costly repairs after it was raised prompted the Corps of Engineers to question the District's need for a government-owned pipeline dredge. However, the resulting report stated that Savannah Harbor had the worst shoaling problem of all the southeast ports and thus required annual maintenance dredging.

The report offered two alternatives. First, "in the event that the public interest and National goals are defined as representing maximum priority to National Defense, responsiveness, and the least cost to taxpayers for Savannah Harbor maintenance," the purchase of a new government dredge was preferable as "the most efficient and economical means of dredging Savannah Harbor."



*The U.S. pipeline dredge* Henry Bacon *suspended under the DeLong Barge used to raise it from the bottom of Savannah Harbor in March 1976. (Savannah District, Corps of Engineers)*

On the other hand, "in the event that the public interest and National goals give priority to maintenance of a viable private dredging industry," all dredging should be done by contract.[58] Either way, the *Henry Bacon* was doomed. The old veteran of Corps of Engineers rivers and harbors projects subsequently was transferred to the state of Georgia and on 28 August 1978 the dredge was sunk 18.7 miles off the coast of Little Tybee Island to become an offshore fishing reef.[59] Despite District support for acquisition of a new dredge, it contracted all pipeline dredging work out to private companies from that time on.

Even before Congress authorized the harbor deepening and the sediment basin project in the fall of 1965, the Senate Committee on Public Works had called for a new study related to further expansion. Thus, as some District personnel planned for the already-approved construction, others were involved in studying the need for future harbor work.

All of this activity required a larger staff for the Savannah District office. The people assigned to the Savannah Harbor work alone far outnumbered the entire District staffs of seven or eight decades earlier. Furthermore, the studies of the late 1960s and the 1970s had become more complicated. At one time the only issues to consider were feasibility of construction and economic value. Now projects had to be examined also in terms of environmental effects and "social well-being."

As always, economic factors were central to any new study and evaluation of harbor modifications. Local harbor advocates always claimed that the harbor as developed or as being modified was inadequate for the needs of current and future shipping and commercial interests. And they were correct. Both the



*The containership* New Jersey Maru *in the inner harbor at Savannah. The size of such ships dramatized the need for widening the harbor and turning basins. (Savannah District, Corps of Engineers)*

commercial traffic and the size of ships were increasing. For example, total tonnages for Savannah Harbor increased from 4.1 million short tons in 1961 to 8.0 million in 1972.[60] The new types of ships expected to use the harbor included Lighter Aboard Ship (LASH) vessels, bigger container ships and dry-bulk carriers, larger oil-bulk carriers, and Liquified Natural Gas (LNG) tankers. Typical of this generation of vessels were the container ships *New York Maru* and *New Jersey Maru,* with lengths of 863 feet, beams of 105 feet, and drafts of 38 feet.[61] The existing harbor turning basins could not accommodate these ships.

The GPA in the early 1970s completed a program of port expansion at its two Savannah terminals. However, the success of this project depended on adequate harbor and turning basin dimensions. In April 1972 the GPA also completed a new facility near the mouth of the harbor to serve LASH ships, on which lighters, or barges, are loaded in "piggy-back" fashion by a shipboard crane. The facility included a turning basin for these ships.[62] Finally, the Southern Natural Gas Company announced its intentions to construct an LNG regasification facility on Elba Island in the lower harbor. Unfortunately, none of the existing turning basins were adequate for the huge LNG tankers, which were 948.5 feet long.[63]

The Senate Public Works Committee apparently was thinking in terms of



*The Georgia Ports Authority's Bulk Handling Facility at Savannah Harbor. Note Kings Island Turning Basin in the upper center of the picture as it appeared before its enlargement in the early 1980s. (Savannah District, Corps of Engineers)*

extending the harbor farther upriver when it called on the Corps for a restudy. However, the Savannah Port Authority requested that the Corps also consider the construction of a turning basin near Elba Island for the benefit of LNG tankers, and the GPA sought enlargement of the Kings Island Turning Basin to serve its Garden City Terminal. The GPA later requested that its LASH turning basin adjacent to Cockspur Island just below Fort Pulaski be included in the existing federal navigation project for maintenance dredging purposes.[64]

Colonel Edwin C. Keiser, District Engineer, made the report for the District in October 1974. In it he dismissed the idea of extending the harbor upriver beyond its present limits as "not warranted or needed at this time." Actually, local interests had decided against development there and instead proposed intensive improvement in the existing harbor. Colonel Keiser did, however, recommend including the LASH Turning Basin in the Federal project except for an area 120 feet wide in front of the LASH berth; constructing a turning basin at Elba Island 2,000 feet long, 1,500 feet wide, and 38 feet deep; and enlarging the Kings Island Turning Basin to a length of 1,600 feet, a width of 1,500 feet, and a depth of 38 feet.[65]

Under the special authority of the 1965 Rivers and Harbors Act, the Senate Public Works Committee and the House Committee on Public Works and Transportation adopted resolutions on 9 June 1976 approving the Kings Island Turning Basin expansion.[66] Until August 1979 the District studied a two-phased approach to the project proposal. The Engineers sought to determine if the authorized plan was "still the most suitable plan of improvement or if some modifications may be desirable and in the national interest."[67]

Following design and engineering work, a construction contract for the turning basin was awarded in August 1980. The work was finished in July 1982.[68] Both congressional committees also authorized the Corps to assume maintenance dredging responsibilities in the GPA's LASH Turning Basin, now called the Oyster Bed Island Turning Basin, but they rejected the Elba Island project on the grounds that it would benefit only one company. That company, renamed the Southern Energy Corporation, subsequently dredged its own turning basin.[69]

The Savannah District was involved in another harbor improvement study at this same time. All the arguments in favor of enlarging Kings Island Turning Basin applied to the request for widening the harbor from 400 feet to 500 feet in the channel along Hutchinson Island. The large ships destined for the Garden City Terminal had to pass through the narrower section of the harbor between the Fig Island and Kings Island Turning Basins. In response to local requests, the House Committee on Public Works in July 1968 authorized a Corps study to determine the feasibility of widening the harbor as far upriver as the Seaboard Coast Line Railroad (SCLR) bridge. On the night of 23 April 1971, a ship struck the SCLR bridge, causing it to collapse. The GPA called for the complete removal of the bridge, which was only 180 feet wide between its fenders, and the Savannah Port Authority requested that the Corps include in its new study the widening of the harbor all the way up to Kings Island Turning Basin. The Chief of Engineers approved this request in January 1972, thus broadening the scope of the District's investigations.[70]

The increased traffic and the larger ships in the upper harbor presented a

*The enlargement of Kings Island Turning Basin, 1980-1982:*




*A. the plan of the work*



*B. construction getting under way in 1980*



*C. construction almost completed, 1982*
*(Savannah District, Corps of Engineers)*



*The increasing size of ships using the inner harbor between Fig Island and Kings Island Turning Basins gave evidence to the need for widening Savannah Harbor. (Savannah District, Corps of Engineers)*

twofold problem. The first concern related to safety; bar pilots reported that the narrow channel was a serious navigation hazard. Second, the existing channel required that ships move slowly, which increased transit time and operating costs.[71]

In his report on the District's findings in August 1976, District Engineer Colonel Frank Walter described the situation:

> "The lower 13 miles of the navigation channel from the Atlantic Ocean to Fig Island Turning Basin have an authorized minimum width of 500 feet. This reach of the harbor is mostly undeveloped. As such, the passage of vessels in the channel is not hampered. However, as the vessels near the main terminals, they are not only confronted with other ships docking and undocking and the numerous smaller vessels which must tend the larger ships, they must also contend with a more narrow waterway as the channel reduces to 400 feet in width. Due to the congestion in the inner harbor, the maneuver area of the channels should be at least as large, if not larger, than that of the approach channels:"[72]

The District considered several plans, evaluating each in accordance with the current government criteria: National Economic Development (NED), Environmental Quality (EQ), Regional Development (RD), and Social Well-Being (SWB). The plan proposed was to widen the navigation channel between Fig

Island and Kings Island Turning Basins to 500 feet by dredging a 100-foot expansion along the north side of the channel next to Hutchinson Island. This involved a distance of approximately 5.6 miles from the eastern end of Hutchinson Island to just east of the Houlihan Bridge at the Georgia Ports Authority's Garden City Terminal. The plan would be justified economically based on a benefit-cost ratio of 1.43 to 1.0; it would also add to employment in the area and have limited negative effect on the environment (which would be outweighed by the benefits).[73]

Progress on the Savannah Harbor widening proposal was very slow. Colonel Frank Walter, District Engineer at the time the feasiblity study was completed, immediately recommended the project in August 1976 as did the South Atlantic Division Engineer. The Board of Engineers for Rivers and Harbors endorsed the plan the following June. However, the Chief of Engineers, Lieutenant General J. W. Morris, did not pass the project recommendation on to the Secretary of the Army until December 1978, and the Department of the Army did not report it to Congress until June 1983.[74]

Local contributions to project construction costs appeared to be one delaying factor. Even as Lieutenant General Morris recommended the project, he advised that the State of Georgia would have to contribute 5% of the construction costs, an estimated $609,000, in accordance with President Jimmy Carter's June 1978 water policy message to Congress proposing state and local government cost sharing with the Federal Government in navigation projects construction. Governor George Busbee of Georgia immediately balked at that idea. William R. Gianelli, Assistant Secretary of the Army (Civil Works), noted in 1983 that the project was incompatible with President Reagan's call for additional sources of funding for such projects.[75]

Finally, in 1986 Congress authorized the Savannah Harbor widening project in the Water Resources Development Act. The law formally required state and local governments to pay a major portion of the construction costs of water development projects in addition to the traditional local contributions, such as purchasing easements and providing dredge disposal areas. Chatham County's total share of the costs of the project was $7.6 million, a little more than half of the total anticipated cost of $14.7 million for the project. The county willingly accepted this responsibility as County Commission Chairman Charles Brooks declared, "This is a great day for Chatham County and we are pleased to be part of this new spirit of cooperation between local and federal governments."[76] In reality, the State of Georgia would be responsible for the local share of construction costs.

While the District awaited authorization of the widening project by Congress, it carried out two important studies related to it. The first resulted in a design memorandum completed in September 1985. Corps engineers reviewed the widened channel design as outlined in the Feasibility Report and considered five alternative alignment designs. They recommended the project with only a slight change in the original alignment plan. As part of the study, the district did a new economic evaluation which improved the benefit/cost ratio to 1.5, and the U.S. Army Engineer Waterways Experiment Station in Vicksburg evaluated the impact of sedimentation and salinity expected from widening the harbor, concluding that there would be an insignificant impact.[77]

The second study also required the services of the Army Waterways Experiment Station: to conduct a ship simulation study to determine the effects of the harbor widening project on navigation and to compare the existing and proposed channels as they affected "ship controllability and operational safety." Captain Bill Brown, president of the Savannah Pilots Association, noted that harbor pilots taking a ship through this part of the channel were "pretty much like a tightrope walker."[78]

The study was carried out under new federal regulations that required such simulations for harbor-widening projects. Unlike earlier studies that used elaborate physical models of the harbor, this study done in 1986 used an extensive computer model of the channel that simulated currents, bottom topography, and channel geometry as well as the movement of a United States Lines, Inc., 950-foot New York Class containership in both the existing channel and the proposed channel. A 45-inch computer screen simulated the bow of the ship and the river channel, and river pilots from the Savannah Pilots Association actually "piloted the ship" through the simulation. The results of the study favored the wider channel in virtually every situation examined.[79]

Even before Congress authorized the project, the Georgia Department of Transportation in March 1986 raised objections to the widening of the harbor. The area of improvement extended under the Talmadge Memorial Bridge, and the DOT feared that widening the harbor would allow ships dangerously close to the north pier supporting the bridge, which would collapse if struck. Moreover, the bridge, which opened in 1954, would accommodate a channel width of less than 450 feet between its supporting piers, and thus a wider channel would have to "bottleneck under the bridge." The DOT wanted widening of the harbor delayed until the State of Georgia could get funding for construction of a new bridge over the Savannah River from Congress.[80] Such funding was forthcoming from both Congress and the state legislature, and construction of a new, higher bridge began in late 1987.

Although the project was authorized in 1986, lack of funding in a time of budget restraints during the late 1980s postponed the awarding of construction contracts. The District anticipated work to begin by May 1988 and then by July 1989, but the decade ended with the harbor widening project, first proposed in 1968, still not started.[81]

One harbor project that was executed in the 1980s was construction of three curve wideners needed immediately to accommodate the large, 950-foot long container ships that started to call at Savannah Harbor. Authorized by Congress in the Energy and Water Development Appropriation Act, 1985, which was passed in July 1984, this work provided for enlarging three bends in the harbor to a depth of 38 feet mean low water between the Talmadge Memorial Bridge and the entrance to the sediment basin in Back River. The project was completed in April 1985.[82] Meanwhile, as in years past, maintenance dredging throughout the harbor and in the sediment basin were annual projects as well.

Through the years Savannah Harbor was the subject of numerous studies and project modifications. Because of the growth in harbor traffic and port facilities and their increasing needs in recent years, long-term planning became a necessity. The Senate Committee on Public Works in July 1972 called for a comprehensive study of Savannah Harbor unprecedented in the harbor's his-

tory. The House committee on Public Works adopted a similar resolution the following October. The harbor was to be reviewed with the goal of providing information appropriate to long-term economic development in the harbor and "long-range plans for harbor modifications, maintenance, dredge material disposal, and stream bank erosion along the navigation channels."[83] Colonel Tilford C. Creel, District Engineer in 1981, declared that "careful planning is vital to insure that the optimum use of land, water, and financial resources for future development is achieved without damage to the environmental quality or social well-being of the area." This, he said, was more important than pursuing specific harbor improvements.[84] His attitude reflected the broader, and increasingly popular, view of Corps of Engineers work.

Funding for this extensive review finally came in 1979, and in October of that year the work began. The Savannah Harbor Comprehensive Study was divided into three planning stages that would provide a "mechanism by which the assumptions, data, and conclusions of the study can be periodically reviewed and refined as the study progresses."[85] Colonel Creel explained the process:

> "Stage 1 planning emphasizes problem identification with reconnaissance level investigations of a wide variety of potential resource management measures to determine whether more detailed studies are warranted. During Stage 2 planning, a broad range of alternative plans and management measures are formulated and screened to determine which plans, if any, warrant more detailed study in Stage 3. Stage 3 emphasizes the detailed assessment and evaluation of a small number of alternatives. It involves analyzing the alternatives to a level of refinement which assures that each plan considered in Stage 3 is formulated in the best possible way to achieve the desired planning objectives, to assure that each plan is implementable, and to support the selection of the best plan."[86]

A report on the first stage in the Comprehensive Study was completed in April 1981. It looked at harbor improvements, of course, because of their importance to the economic growth of Savannah. The study echoed previous reports in support of widening the harbor between the Fig Island and Kings Island Turning Basins. The report also considered harbor deepening but found it to be economically unjustified at the moment. Moreover, turning basins were judged adequate for the present time. In addition, the survey studied several channel realignments. For example, one proposal reconsidered the idea of a new channel cut across Elba Island, and another looked at a new channel from the mouth of the harbor across the bar to the open sea. Both were deemed unacceptable. The report did concede that the expansion of port facilities in the present harbor area was "approaching its limit" and proposed that the second stage of the study examine the possibility of extending the harbor above the Houlihan Bridge, the U.S. Highway 17 Coastal Highway bridge.[87]

In preparing its report, the District accounted for public concerns about additional development in Savannah Harbor as related to the environment and economic matters. The environmental problems associated with disposing of spoil from maintenance dredging commanded so much attention that Colonel Creel urged that Stage 2 studies emphasize "environmental studies and the development of a long range disposal plan...which allows timely, efficient, and

economic maintenance of the harbor."[88]

The District continued the next phases of the comprehensive study in light of growing demands for a deeper and bigger harbor. Maritime business interests argued that dredging the upper harbor to a depth of 40 feet was necessary to permit larger ships to navigate the channel and thus attract more business to the Savannah port. Finding new disposal areas for spoil dredged in the next 15 to 20 years as required for maintaining the channel was a priority. The Georgia Ports Authority called for extending the harbor 2 miles upstream above the Houlihan Bridge to property which the GPA eventually bought on the south side of the river known as Mulberry Grove and Drakie plantations, a site across the river from the Savannah National Wildlife Refuge. Congress expanded the scope of the comprehensive study in 1984 to include a review of this idea.

The second phase report, the Preformulation Report, was completed in January 1983. Colonel Charles E. Dominy, District Engineer, recommended continuation of the comprehensive study into phase three, the Plan Formulation Phase, and he emphasized the search for new spoil disposal sites and harbor deepening.[89]

The proposal to deepen the harbor drew major criticism from environmental agencies. A spokesman for the U.S. Fish and Wildlife Service, for example, protested that the deeper channel would allow more salt water to move up river and endanger the mostly fresh water Savannah National Wildlife Refuge. He claimed that the tide gates on the Back River, completed a decade earlier, had already increased salinity intrusion, and he argued that a deeper channel would aggravate the problem. The Georgia Department of Natural Resources called on the Corps to further examine the environmental impact of deepening the harbor on the river and adjacent marshlands. South Carolina officials com-



*Savannah Harbor, 1982. (Savannah District, Corps of Engineers)*

plained that the spoil dredged in this project would be deposited in South Carolina territory rather than in Georgia though Georgia gets the greater share of benefits from the harbor.[90] Col. Stanley G. Genega, Savannah District Engineer, announced in late January 1988 that the District would delay further action on the harbor deepening project until completion of a new study to determine the possible effects of increased amounts of saltwater on the Savannah River and freshwater wetlands adjacent to it. That study was yet to be done by the end of 1989.

South Carolina also directed major criticism at the Corps regarding its selection of new spoil disposal sites for the future. Nine of 11 possible sites identified were in South Carolina, and all of them involved wetlands. Moreover, critics of the harbor extension idea feared the environmental impact on the Savannah Wildlife Refuge; some argued that new port facilities could be developed with less threat to the natural environment on Wright Island on the South Carolina side of the river some 8 miles downriver from Savannah.[91]

The final report in the comprehensive study was scheduled for completion in May 1990. In it the Savannah District would continue to seek ways to deal with a narrow, shoaling harbor that needs continual improvement and maintenance if Savannah is to remain a major U.S. port. And all of this had to be done in the context of the complex issues of late twentieth century America.

# 14 NAVIGATION PROJECTS

## BRUNSWICK HARBOR

Certain Savannah District projects waned in importance during the first half of the 20th century, none more dramatically than that in Brunswick Harbor. Once ranked as the second most important harbor in the District, and with increases in trade through the 1920s that made it rival Savannah Harbor, Brunswick Harbor declined rapidly as a port in the Depression era. Despite efforts to return the harbor to a position of economic importance in the post-World War II period, the District focused its attention on other projects.

Cotton and naval stores had been among the most important commodities to pass through the harbor. However, the boll weevil's damage caused cotton production to plummet in Georgia after World War I. The Depression then brought a decline in naval stores shipments. After the establishment of the Atlantic Refining Company on the Turtle River above the city, petroleum products had figured significantly in the trade of Brunswick. But in 1936 that company closed its plant. At the same time the railroads serving Brunswick closed or discontinued much of their terminal use due to declining business. As one report later pointed out, "Without railroads bringing cargo to the port, steamships had no reason to call...." Most of Brunswick's traffic was redirected to Savannah or Jacksonville, where it remained even after economic conditions began to improve. Naturally, the port's decline reduced the need for expansion or maintenance in the harbor.[1]

World War II further attenuated the commerce moving through Brunswick's Harbor. The J.A. Jones Construction Company built cargo ships, and the Brunswick Marine Construction Company built minesweepers there during the war. However, the Federal Government stopped all shipping through Brunswick during the war. In 1946 the executive director of the GPA stated that the "present dearth of commerce through the port is entirely due to the fact that such wharves as were used before the war to handle regularly scheduled sailings were allowed to deteriorate during the war." The inadequacy of docks and terminal facilities plus the lack of project depths "forced prospective shippers to transfer their business away from Brunswick," he added. The District Engineer, Colonel Paschal Strong, reported that the Southern Railway Wharf on Turtle River "has so deteriorated that it cannot be used." The abandoned Atlantic Coast Line Wharves on Academy Creek were "unserviceable." The

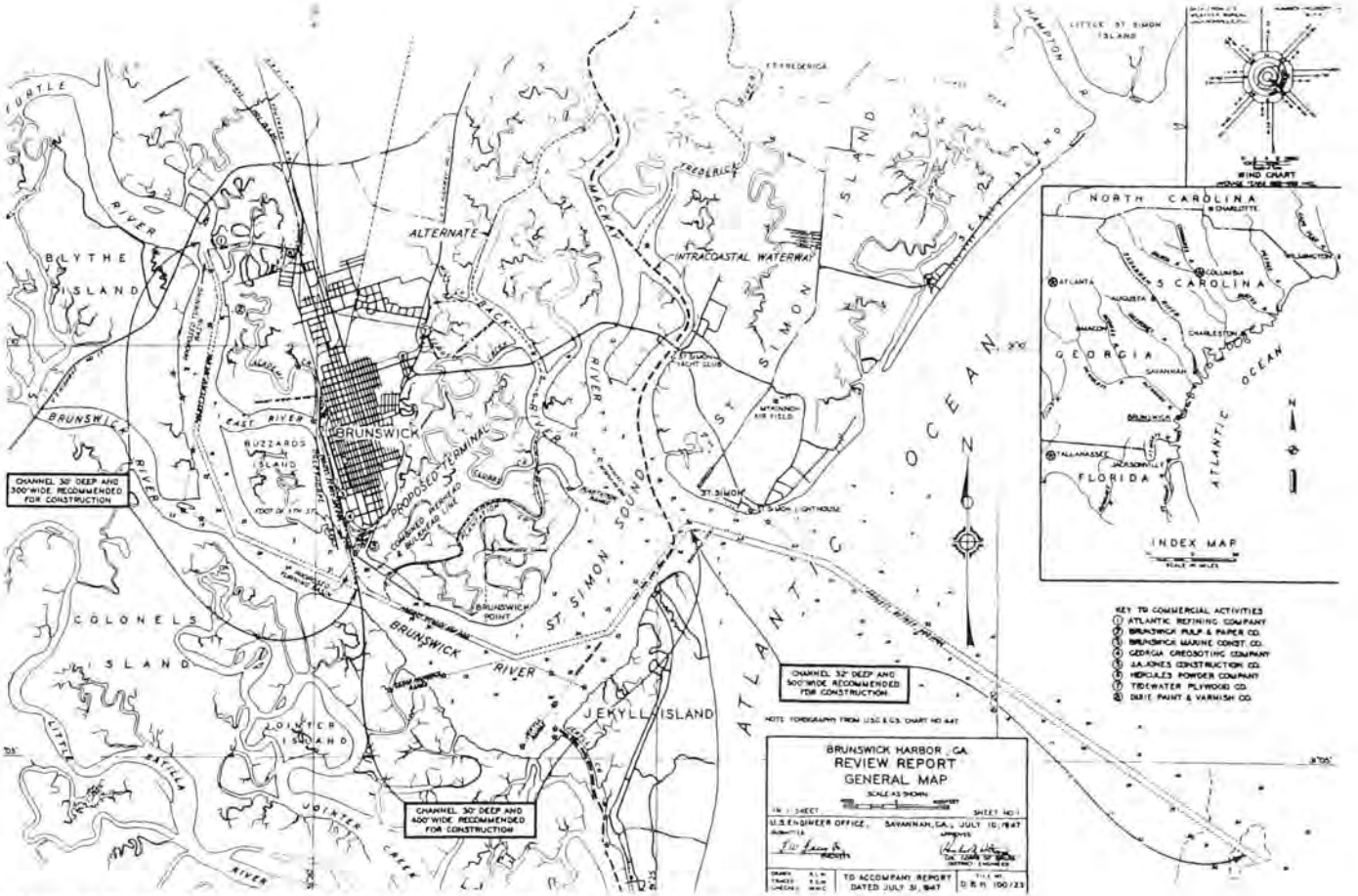
city wharf, the once thriving Downing Company Wharf, and the Southern Railway Wharf, all along Bay Street, also were "in poor condition."[2]

Actually, the Corps of Engineers did not desert the Brunswick project completely. During the 1940s, hired labor and government plant such as the hopper dredge *Culebra* and pipeline dredge *Creighton* undertook maintenance dredging operations on the bar channel and in East River, Turtle River, and Terry Creek. On occasion contract dredges also operated on the waterways. However, such activity was inadequate to maintain the authorized harbor dimensions. The authorized project provided for a channel 27 feet deep, but by 1947 the safe draft for ships was only 25 feet. Vessels requiring deeper water had to wait for high tide conditions, a time-consuming situation reminiscent of harbor conditions decades before.[3] On the other hand, the Engineers stated that the amount of commerce using the port did not justify restoring it to full project dimensions.[4] The District Office finally closed the Brunswick sub-office in November 1943, reflecting the harbor's status within the hierarchy of Savannah District projects.

Following World War II, local interests began once more to champion the development of Brunswick Harbor. In fact, they called for an expansion. The State of Georgia joined in this effort. The recently chartered GPA, already active in Savannah Harbor, proposed building a terminal near the site of the J.A. Jones Shipyard. However, because of constitutional questions regarding the funding of this proposal, the State Supreme Court ruled against it in January 1947. Glynn County and the City of Brunswick, working through the Brunswick Port Authority (BPA), purchased the Jones property with intentions of establishing a terminal facility there. The most ambitious plan for harbor enlargement suggested by local supporters envisioned a channel 36 feet deep and 600 feet wide across the bar and 34 feet deep and 500 feet wide in the inner harbor. Later the dimensions were reduced to 32 feet deep and 500 feet wide across the bar and 30 feet deep and 300 to 400 feet wide in the remainder of the project.[5]

The GPA continued to back the harbor improvement proposal while attempting to realistically appraise the situation. The director confessed that Brunswick probably would always fall behind Jacksonville, Savannah, and other major southern ports in terms of handling general cargo, but that the harbor did have potential for handling specialized cargoes because such facilities could be provided to accommodate new industries moving into the South. He stressed, however, that reviving the port first required enlarging the harbor channel to accommodate the larger types and sizes of vessels.[6]

In light of the local crusade, the Savannah District reevaluated Brunswick Harbor. Colonel Strong made the subsequent report, which took a cautious approach in view of the fact that most of the arguments in support of the expanded project were based on speculation. "The post-war water-borne commerce of the South Atlantic coast is now being organized and built up without including Brunswick in the picture," he wrote. After reviewing four options, Colonel Strong recommended a plan that he believed would "safeguard the previous Federal investments in channels," serve those companies already operating in Brunswick, and "allow development of the port commensurate with local effort and the merit of the enterprise." His proposal called for modifying




*Map of Brunswick Harbor, 10 July 1947. (H. Doc. No. 110 81st Cong., 1st Sess.)*

the present project to provide for a channel following the existing route but only 32 feet deep and 500 feet wide across the bar; 30 feet deep and 400 feet wide through St. Simons Sound, Brunswick River, and East River to the foot of Fifth Street in Brunswick; and 30 feet deep and 300 feet wide in Turtle River to the wharf of the Atlantic Refining Company, which continued to operate gasoline and fuel oil storage facilities until the late 1940s. Other specifications for the harbor remained as set by earlier legislation: 27 feet deep and 350 feet wide in the East River from Fifth Street to Academy Creek and 24 feet deep and 150 feet wide in Academy Creek. The plan also recommended a turning basin opposite both the former J.A. Jones Shipyard and the Atlantic Refining Company.[7] After reviewing Strong's report, the Board of Engineers for Rivers and Harbors stated that it was "not convinced of the advisability of the construction of the project." At further hearings and discussions local interests testified and provided additional evidence to support the project. Finally, the board endorsed it. Congress included Brunswick Harbor in its list of authorized projects in the Rivers and Harbors Act of 1950.[8]

Authorization of the Brunswick Harbor modification did not mean that dredging operations would start immediately. Fifty years ago, congressional authorization included funding, and projects started quickly. By mid-century this was no longer true. Often authorization predated funding by several years. The main cause of delay in the new Brunswick Harbor project was the slow growth of industry. In the next several years, the predicted growth failed to materialize, and thus commerce using the port did not meet expectations.[9] Regular calls by deep-draft ships ceased when the Atlantic Refining Company stopped bringing in tankers. In 1953 only six ocean vessels entered Brunswick Harbor.[10] Accordingly, an expanded harbor would not be needed. Between 1950 and 1959 the Corps undertook no new work and carried out maintenance dredging operations there only twice, in 1952 and 1957, using the hopper dredge *Gerig*.[11] In some years the *Annual Report* listed the harbor among the inactive projects.

The late 1950s saw a sudden upswing in industrial growth, however, and with it a demand for an expanded harbor and better facilities. In 1956 the Allied Chemical Corporation acquired the site of the Atlantic Refining Company on Turtle River and constructed a chlorine and caustic soda plant for its Solvay Process Division. The plant would need to import 150,000 tons of salt per year, and this development stimulated the Corps' maintenance work in 1957. Then the Bestwall Gypsum Company announced it would build a plant in Brunswick if a suitable dock were made available for unloading the tons of gypsum rock shipped in from abroad. This move prompted city and county officials to promote a bond issue in 1958 to raise money with which to build the long-planned BPA facility on part of the property acquired from the old J.A. Jones Shipyard. This dock, located at the mouth of East River where the river joins the Brunswick River, was completed in 1959 and named Lanier Dock after the famed Georgia poet. The Georgia legislature then appropriated $2 million for the GPA's use in building a state facility adjacent to the BPA dock. This was dedicated in August 1960.[12]

Commercial activity in the harbor began to increase dramatically. Traffic in 1959 was almost 2.5 times that of 1953, and 1960 saw even greater growth.[13]



*Brunswick Harbor where East River joins Brunswick River. Left-center in the picture is the old J.A. Jones shipyard purchased by the Brunswick Port Authority after World War II; left of that is the Georgia Ports Authority terminal. Across East River is Andrews Island, the Academy Creek flows into East River to the north. 1964. (Savannah District, Corps of Engineers)*

Statistics showed that the growth was related directly to the completion of the new dock facilities. A restudy of the Brunswick project in January 1959 finally recommended that new construction begin. The Savannah District Office contracted the new work on the East, Turtle, and Brunswick Rivers, while using the government hopper dredges *Gerig* and *Goethals* on the bar channel and in St. Simons Sound. The project as defined in 1950 was completed in 1960.[14] Accord-

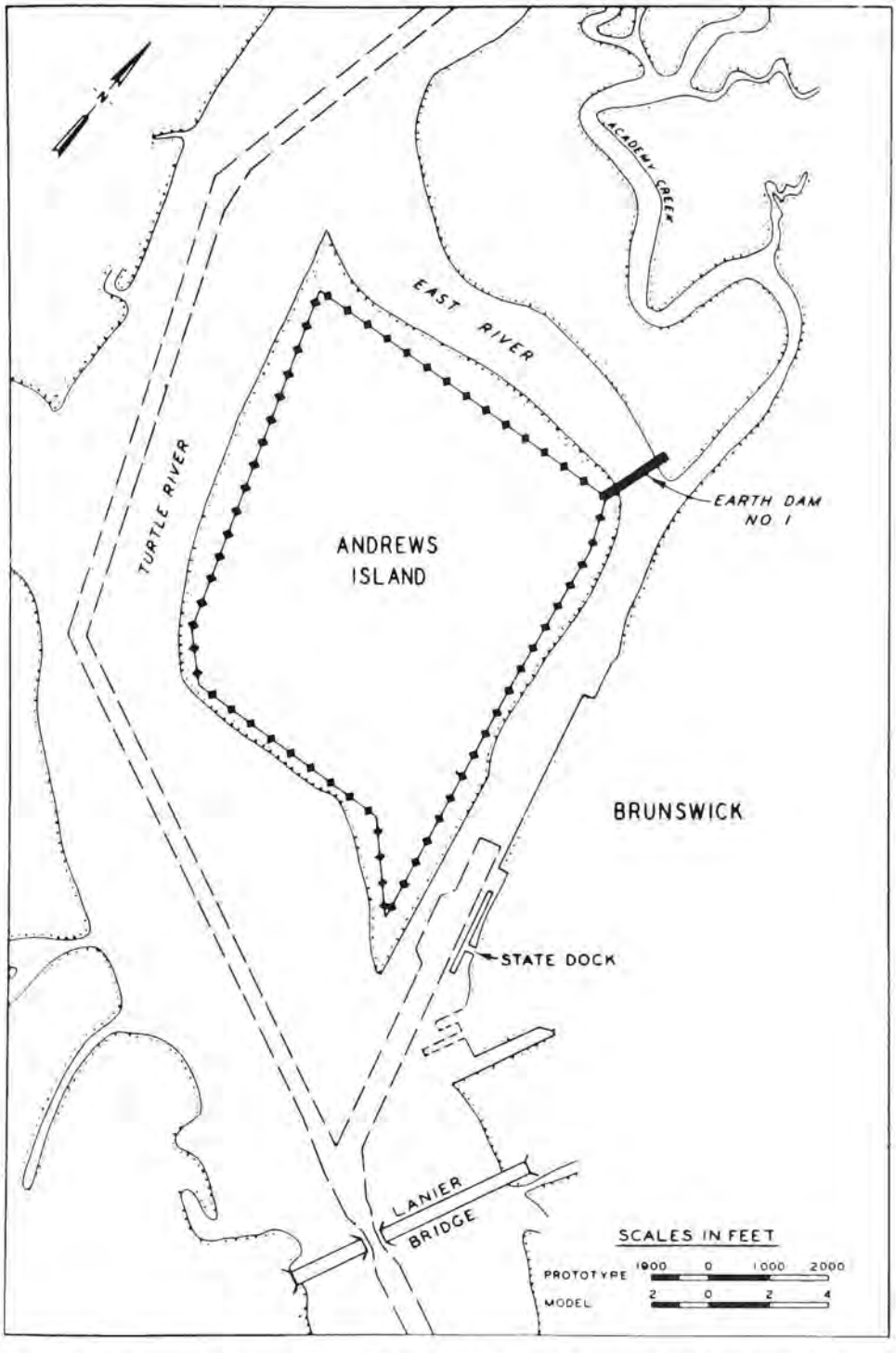



*The model of Brunswick Harbor built at the U.S. Army Waterways Experiment Station, Corps of Engineers, in Vicksburg, Mississippi, in 1966. (Savannah District, Corps of Engineers)*

ing to the Brunswick newspaper, the city's harbor was "reborn rather than revived." The harbor was not only larger than ever, but the new steel and concrete dock facilities had replaced the old wooden structures of the earlier days.[15] A new era had begun for Brunswick Harbor.

Rapid shoaling immediately plagued the harbor and the Corps of Engineers' efforts to establish and maintain the project dimensions. District dredges could be seen performing maintenance dredging over the next several years. The East River, along whose banks the recently constructed docks were located, was especially susceptible to shoaling and thus commanded special Corps attention. Evidence collected in the model studies of Savannah Harbor had shown that dredge spoil should be confined. Otherwise it could wash back into the harbor to cause further problems. The Savannah Engineers decided that dikes should be constructed around the East River spoil areas, declaring that "complete retention of the spoil should greatly reduce the rate and quantity of shoaling; however, if serious shoaling continues additional studies will be made."[16] Accordingly, the District let contracts for building a 12-foot dike around Andrews Island, known in earlier years as Buzzard's Island and located across East River from the Port docks. This island was to be the principal spoil area for dredging in East River, and the dike project was completed in March 1961. Local harbor supporters applauded this work because the diking and filling in of the island would provide land for future Port development.[17]

Diking the spoil areas failed to solve the shoaling problem. In fact, regular maintenance dredging was necessary to keep the harbor in satisfactory condition, especially in East River. The Corps meanwhile investigated the problem in




*Phase 1 of the complete East River Closure. (Technical Report H-72-5 of the U.S. Army Engineer Waterways Experiment Station)*

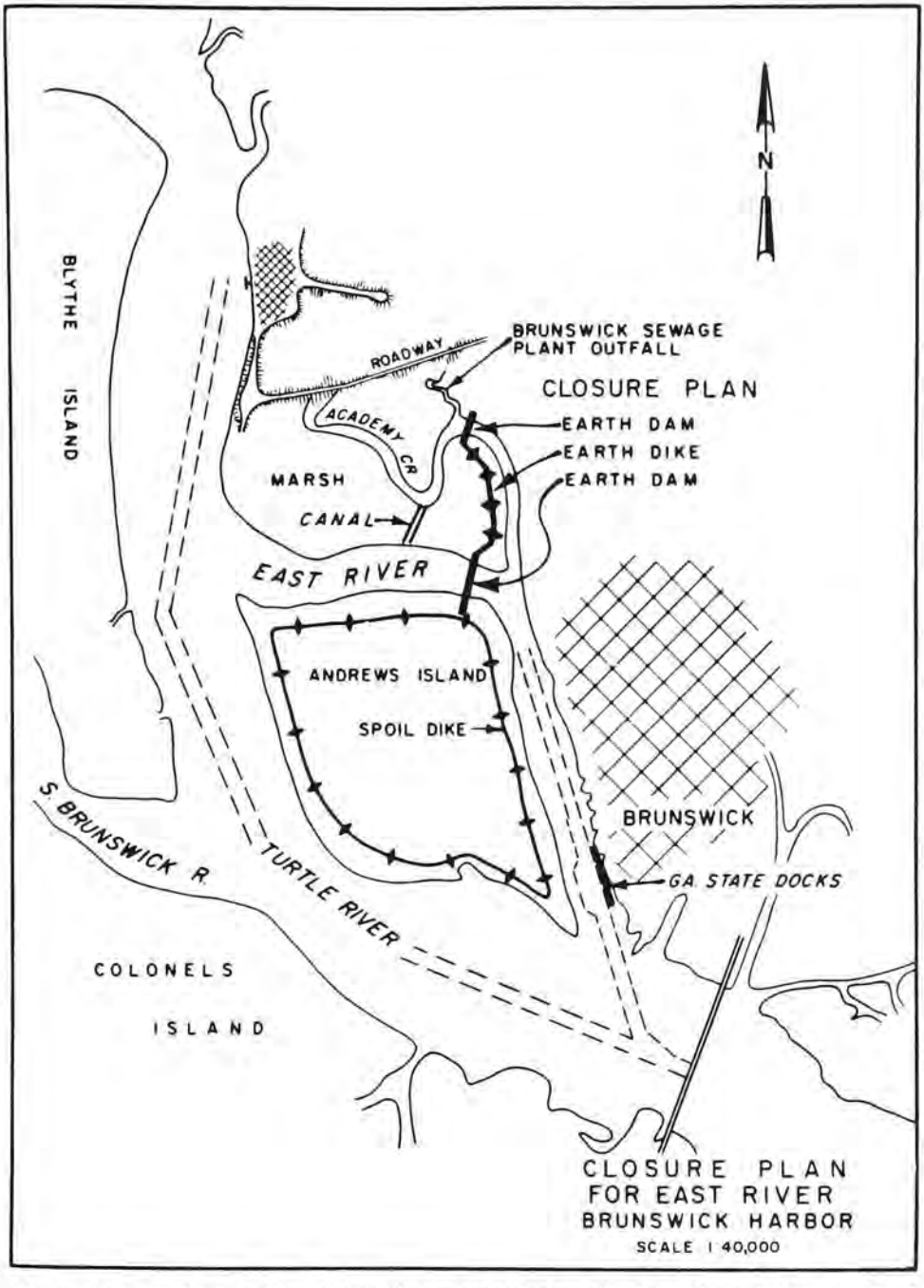
the harbor. Using information provided by the Savannah District, in 1966 the WES in Vicksburg completed a model of Brunswick Harbor with which to further study the situation.

The Engineers carried out tests on five plans for modifying East River. Finally, they recommended building a dam across East River above the mouth of Academy Creek, a closure dam across Academy Creek, a canal connecting East River and Academy Creek, and a dike along the west side of Academy Creek. After a November 1967 public hearing in Brunswick, the project was divided into two phases and later approved. Phase I included the dam across East River near the mouth of Academy Creek, and this work was done by contract in 1969. The dam succeeded in reducing overall annual shoaling by approximately 300,000 cubic yards.[18] Phase II of the project was delayed a number of years in part due to enactment of the National Environmental Policy Act in 1969. The act requires that federal agencies prepare detailed environmental impact statements before any major action is taken affecting the natural flow of a body of water. Moreover, the WES was conducting additional model studies. The Savannah District Office prepared the Environmental Impact Study (EIS) on the effect of Phase II work. In the meantime the construction proposal was changed to provide for a straight-line dike along the west side of Academy Creek, rather than the earlier suggested broken-line dike, and for relocating the canal between East River and Academy Creek immediately behind the dike, rather than a few yards farther west as originally planned. The Corps awarded a contract in May 1974 for construction of the canal and dike, and the work was completed in June 1975. A separate contract provided for the Academy Creek closure, and this part of the project also was finished that summer.[19] East River thus became a tidal basin.

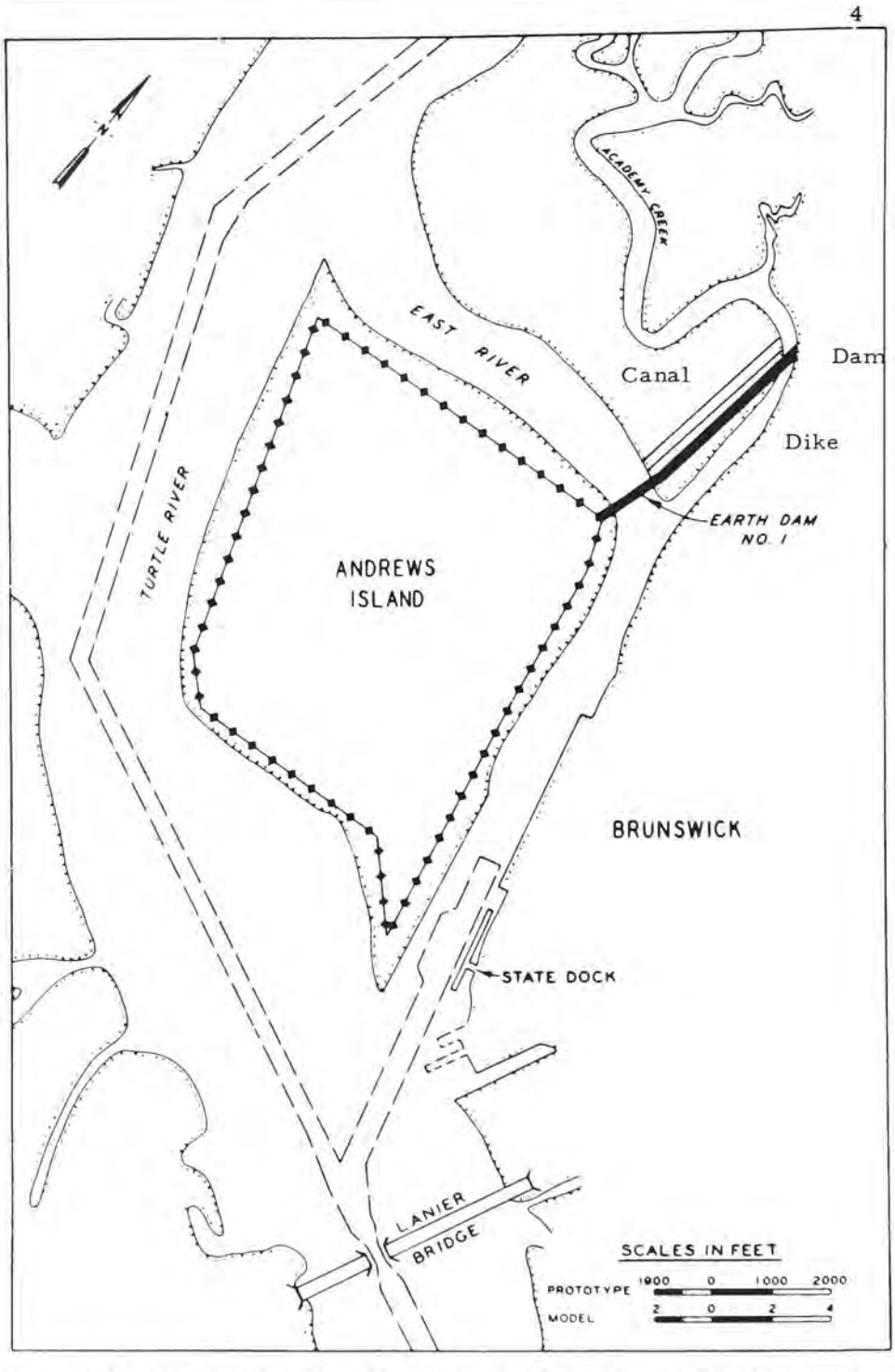
Such well-known Corps vessels as the pipeline dredge *Henry Bacon* and the hopper dredge *Gerig* did maintenance dredging regularly in Brunswick Harbor during the 1960s. On occasion, the District used less familiar government plant such as the U.S. hopper dredges *Lyman* and *Hyde*. The District Office also contracted some of this dredging to private companies that brought in the *St. Louis, Natchez,* and *Arlington*. These dredges generally were employed on the bar, in St. Simons Sound, and in East River up to the foot of Second Street in Brunswick. The remainder of East River and Academy Creeks were considered adequately deep for the fishing vessels and other shallow-draft craft that used them.

Not all maintenance work was devoted to preserving harbor depths. The 1950 authorization for the current project provided that the Chief of Engineers had authority to widen the entrance and turning basin of East River, and in 1964 the Savannah District did just that. The mouth of East River was widened from 400 to 600 feet for a distance of 1,000 feet.[20]

The Corps' renewed attention to Brunswick Harbor plus the efforts of the BPA and GPA to develop port facilities and promote the attractiveness of the harbor helped to make the rebirth of Brunswick Harbor a reality in the 1960s. The total tonnage passing through the port continued to increase. However, the increased traffic and the larger ships began to create new problems for a harbor planned to meet the conditions of some two decades earlier. Harbor advocates began to lobby for an enlarged harbor and a depth of 40 feet.




*Original closure plan for East River, Brunswick Harbor, 1967. (Technical Report H-72-5 of the U.S. Army Engineer Waterways Experiment Station)*




*Phase 2 of the complete East River Closure showing design change of the dike, canal and Academy Creek Dam. (Technical Report H-72-5 of the U.S. Army Engineer Waterways Experiment Station)*

Local interests wanted more than just an expansion of the existing harbor, however. The current port area of Brunswick along the East River provided little room for growth of facilities. However, Colonels Island located farther up the Brunswick and Turtle Rivers from the town and fronting on the South Brunswick River offered much space for new port facilities. This island had been purchased by the Georgia Ports Authority in 1962 for just that purpose. The only impediment to the development of Colonels Island was that the Brunswick Harbor project did not include the South Brunswick River leading to it; ships had no way to reach Colonels Island. Hence, local civic and business leaders called on the Corps to include a 40-foot channel to Colonels Island in any harbor modification plans. At the same time, Brunswick citizens appealed to the Georgia General Assembly for funds to support a bond issue for building storage warehouses and other facilities to handle general cargo and containerized cargo on Colonels Island.

Out of all of this developed a rather frustrating situation for Brunswick. In response to local requests in 1964 for deepening the harbor, the Savannah District had made a study and prepared a report in 1969 recommending extensive harbor modification based on the assumption that new industry would locate on Colonels Island. This plan was abandoned later, however, in the absence of firm commitments. Yet commerce using Brunswick Harbor continued to increase during the late 1960s and into the 1970s, and local concerns again called for harbor expansion.[21]

In all discussions concerning justification for the channel to Colonels Island, the District maintained that it needed concrete evidence that industries and shippers would use the new channel. Colonel Edwin C. Keiser, District Engineer, stood firm in stating that the Corps could not recommend the Colonels Island channel unless it was assured that industries would locate on the island and use the expanded harbor.[22] Local interests again asked the legislature to fund port development by the Georgia Ports Authority with which to attract commerce. Ironically, the State refused to provide development money without prior Corps of Engineers agreement to establish the harbor channel to the island.[23]

At the urging of Georgia Congressmen and Senators and City and County Officials, the Savannah District began restudying Brunswick Harbor in 1974. Colonel Keiser issued the harbor modification feasibility report in August 1975. The report, which favored harbor improvements, noted, "Historically, the general economy of Brunswick and Glynn County has been tied to the shipping activities of the port for over a century." The report further stated that "the present navigation channel is inadequate to fully accommodate many of the vessels presently calling at the port," and "the existing 30-foot channels are impeding the movement of commodities in the harbor."[24] The report proposed deepening the bar channel from 32 feet to 38 feet and deepening all other parts of the harbor, including East River up to Second Avenue, from 30 feet to 36 feet. It also called for enlarging the turning basin in East River from 700 feet by 1,000 feet by 30 feet to 875 feet by 1,000 feet by 36 feet.[25]

Colonel Keiser's plan also provided for constructing a channel 36 feet deep, 300 feet wide, and 5,700 feet long in the South Brunswick River leading to the proposed Colonels Island port, as well as a turning basin in the South Bruns-

wick River 36 feet deep, 100 feet wide, and 1,000 feet long. As with the previous recommendation, this one was contingent on the assurances that industry would locate on Colonels Island and enough commerce would be generated to justify the expenditures for South Brunswick River development. Colonel Keiser stated that should development of Colonels Island not "proceed within a reasonable time," this part of the project could be deauthorized.[26]

The Savannah District of course had the option of suggesting no further improvements for Brunswick Harbor. The District's 1975 report declared, "To accept the alternative of 'no improvement at this time' would . . . reduce the effectiveness of the Port as an economic asset to the southeastern section of Georgia." The Engineers declared, "As the vessels in the world fleet continue to increase in size and as the older, smaller vessels are phased out of service, harbors with limited depths such as Brunswick will be hard-pressed to continue to attract ocean commerce." The Port of Brunswick would be reduced to one serving "very small ships and barge traffic" unless the Corps, as authorized by Congress, came to its rescue.[27]

The Board of Engineers for Rivers and Harbors responded positively to the sections of the feasibility study dealing with enlarging the original harbor. However, the board felt that establishing the South Brunswick River channel to Colonels Island was not justifiable economically. Speaking for the board, Colonel Robert L. Bangert declared that "feasibility of the Turtle River — South Brunswick River increment of the project has not been demonstrated without inclusion of benefits attributed to location of an unidentified industry on Colonels Island."[28] Meanwhile, a $1 million state appropriation to begin developing the Colonels Island facility lapsed because it depended on the Corps' beginning to dredge the South Brunswick River channel. Georgia Congressman Bo Ginn summed up the problem: "The Corps' project hinges on cargo tonnage justification for harbor work, while the state project hinges on having an adequate navigation channel to the [Colonels Island] site...."[29]

The citizens of Brunswick then prevailed on Congress to authorize advanced engineering and design studies for the harbor in the 1976 Water Resources Development Act, relating not only to modification of the existing harbor but to creation of the deep-draft channel to Colonels Island as well. The latter provision was based on the presumption that industry and a shipping terminal needing such a deep-draft channel would be developed on the island.[30] The District began Phase I of the new studies in 1977 and completed them three years later.

The new findings resembled those in the previous study. First, Brunswick Harbor would become increasingly inadequate to accommodate larger vessels and "deepening the existing channel could greatly increase the economic efficiency of vessels calling at Brunswick." The report noted the existence of several rock formations in the East River, which restricted the controlling depth to only 29 feet. Concerning the matter of a channel to Colonels Island, the document remarked that the Federal Government would be "reluctant to provide a channel where there is not firm commitment for the development of port facilities and industry." Nonetheless, the report proposed a plan for deepening the bar channel to 38 feet, the channel from the bar to the mouth of the South Brunswick River to 36 feet, and the rest of the present harbor to 34 feet; and also for



*Aerial view of Brunswick Harbor, looking down the harbor, 1982. (Savannah District, Corps of Engineers)*



*A public meeting held in Brunswick, Georgia prior to the beginning of project work in Brunswick Harbor, 1979. (Savannah District, Corps of Engineers)*

developing a channel 5,600 feet long, 300 feet wide, and 36 feet deep to Colonels Island with a turning basin 1,000 feet by 1,000 feet in the South Brunswick River.[31]

Public sentiment favored the expanded harbor; local leaders saw it as vital to the economic growth of the area. The old Brunswick-Savannah rivalry emerged when State Representative Dean Auten of Brunswick argued, "For too long, Brunswick has been in the shadow of Savannah allowing opportunity after opportunity to pass by."[32] The Coastal Georgia Audubon Society opposed the expansion, however, claiming that the Corps was underestimating the costs of development and that new dredging in the harbor and disposal of the spoil adjacent to the harbor would cause environmental harm to the marsh areas nearby.[33]

The hopes of the Brunswick Harbor advocates were dashed when Colonel Tilford C. Creel, District Engineer, announced that he would not recommend the new project. He stated that it was not economically justified. "If any of the potential traffic does not materialize then none of the alternatives considered (in the plan) have benefits which equal costs," Creel explained.[34] Brunswick Mayor Reggie L. Holtzendorff protested that the Corps was "planning great things for Savannah" while rejecting Brunswick's appeal for harbor development.[35] In fact, in past years the District Engineer had considered anticipated traffic in justifying project modification, but the economics of the 1980s forced a change in this approach to planning.[36] Brunswick eventually would get the channel to Colonels Island when the State of Georgia appropriated funds. The



*Maintenance dredging in Brunswick Harbor in 1982, with spoil being deposited on Andrews Island across the harbor from the City of Brunswick. (Savannah District, Corps of Engineers)*

Georgia Ports Authority began dredging in 1982 after the Savannah District granted the necessary permit.

During these years of restudy, the District did carry on maintenance dredging in the established harbor. Most of the work was done under contract, although government vessels such as the hopper dredge *Hyde* worked on the bar channel. The Corps awarded a contract for removal of rock obstructions in East River, which was completed in 1983, and another to raise the dikes on the Andrews Island spoil disposal area.[37]

The GPA completed the channel connecting Colonel's Island with the main part of Brunswick Harbor in 1983 and began construction of bulk cargo terminal facilities there as well as new facilities at the Mayor's Point Terminal in the East River. Brunswick Mayor Holtzendorff wrote Colonel Dominy, "The harbor will handle increased tonnage as the economy improves; and further major increases will occur as The Mayor's Point and Colonel's Island Terminals' cargoes begin moving by early 1985."[38] The new potential for Brunswick Harbor aroused the call for a deeper harbor once more. Congress responded to public support by authorizing the Savannah District to renew the Brunswick Harbor study and update its recommendations based on the new economic data.[39]

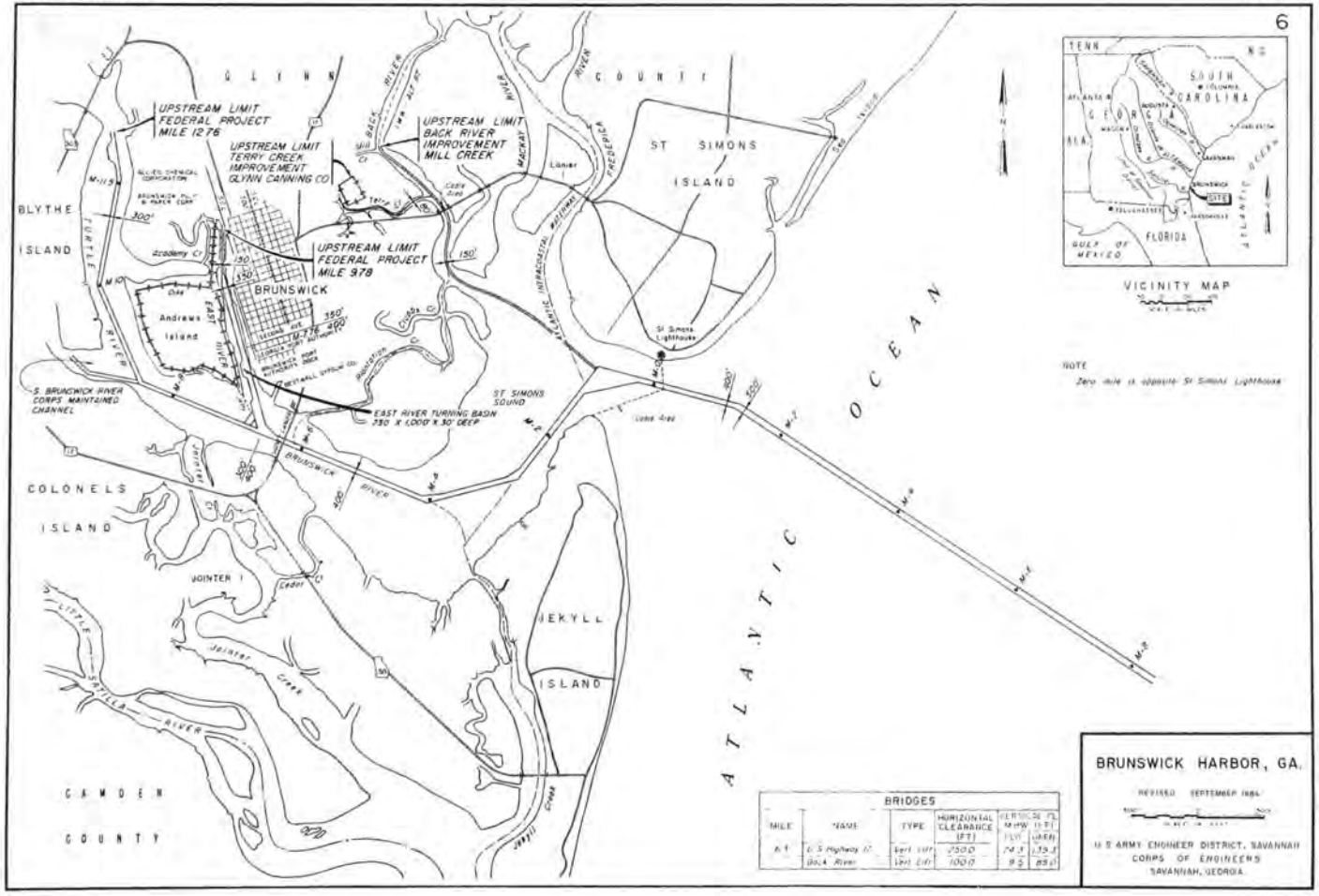
The report, completed in September 1984, was very positive. It referred to Colonel's Island as having a "rare combination of advantages" in that it was "one of the few sites on the U.S. east coast offering deepwater sites with rail, highway, and utility amenities in place." Moreover, it recognized that the present harbor depth of 30 feet at mean low tide was a liability and thus recommended that a more detailed feasibility study be done.[40] Brunswick Harbor enthusiasts wanted a harbor of at least 36 feet.

This feasibility study got caught in the cost-sharing arguments of the mid-1980s. Congress appropriated the necessary funds to get it underway, but in light of the Reagan administration's insistance that local sponsors contribute half the money for new construction project studies, the Corps, under orders from the Office of Management and Budget, held-up the Brunswick Harbor study in early 1985. Disagreeing with the President, later that year Congress funded the entire first stage of this study, along with other projects nation-wide, at total federal expense. The Savannah District initiated the study in November 1985.[41] The activities included hydrology and hydraulic studies and environmental studies related to spoil sites. Congress provided additional funding to update economic studies as well as initiate an environmental impact statement and prepare dredging plans. The District anticipated completion of the final Feasibility Study Report on Brunswick Harbor in 1990. Meanwhile, Congress added the Colonel's Island 30 foot by 8000 foot channel dredged by the GPA in the South Brunswick River to the Brunswick Harbor project in the Water Resources Development Act of 1986.[42]

## SAVANNAH RIVER BELOW AUGUSTA

The project to establish a navigation channel 6 feet deep and 75 feet wide on the Savannah River from the upper limits of Savannah Harbor to Augusta was completed in 1939. Two years earlier the New Savannah Bluff Lock and Dam had been finished through Public Works Administration efforts. The Savannah

CORPS OF ENGINEERS U S ARMY





*New Savannah Bluff Lock and Dam on the Savannah River looking downstream. The structure was completed in 1937. (Savannah District, Corps of Engineers)*

District became responsible for maintaining the channel and operating the lock and dam. A lockmaster, assisted by a staff of five, operated the lock and dam and did general repairs to the structure and its support buildings.

Maintenance work was done largely by hired labor using government plant and included yearly shagging operations. Each year during the late 1940s, the snagboat *Macon* lifted snags and sunken logs from the channel. Corps employees also carried out limited dredging activities and repaired or improved open channel works built in previous years to restrict the river's channel. Moreover, they constructed further bank protection of woven lumber mattresses covered with stone. On occasion the District also had additional pile dikes placed in the river under contract. Despite these efforts, however, the river channel was not navigable due to insufficient water levels, shifting shoals, sharp bends, and the ever-present snags and sunken logs.[43]

Commerce declined on this section of the river during the Depression, a situation that continued into the postwar years. The 17,500-ton figure reported for 1945 was the lowest annual tonnage recorded since 1886. Pulpwood and logs were the only items shipped downriver; in some years traffic moving upriver ceased completely.[44] Yet, as World War II ended, local commercial and industrial interests, especially in Augusta, began to call on Congress for further improvements to the channel, including deepening it to 9 to 12 feet. The Senate Commerce Committee in turn called on the Corps to review the project and make recommendations.

*Four photos showing the type of bank protection built by contractor Leroy H. Simkins for the Corps of Engineers on the Savannah River below Augusta prior to World War II.*



*Canoe Cut on the Savannah River below Augusta before construction of bank protection work was begun by Leroy H. Simkins of the Corps of Engineers. 16 October 1940. (Savannah District, Corps of Engineers)*



*Construction of lumber mattresses for use in bank protection at Canoe Cut. Workers built the mattresses on a barge and then placed them along the bank at water's edge as seen in the foreground. 20 November 1940. (Savannah District, Corps of Engineers)*



*Workers placing stones on the lumber mattresses as part of the bank protection at Canoe Cut. 20 November 1940. (Savannah District, Corps of Engineers)*



*Completed bank protection at Canoe Cut on the Savannah River below Augusta. 5 December 1940. (Savannah District, Corps of Engineers)*

The Savannah District focused a great deal of attention on prospective commercial potential. The results of questionnaires and other inquiries, as well as testimony given at a public hearing in Augusta, indicated that an amazing 400,000 tons of additional waterborne commerce would use the improved Savannah River at a savings in transportation costs of $465,000. Much of this anticipated traffic was to come from new industries expected to locate in the Augusta area as a result of the cheap electricity that would be available after completion of the Clark Hill Dam. Colonel Paschal Strong, the District Engineer, asserted, "Such prospective traffic and savings appear so probable that they materially enhance the justification for the improvement request."[45] Augusta presumably had the potential for becoming a great inland Port in the Southeast.

Strong ruled out the idea of a 12-foot channel, saying that the undertaking would require "canalization of the river by costly locks and dams." Such an expense was not justified even by the increased traffic expected. He did, however, recommend a channel 9 feet deep and 90 feet wide at the bottom, which could be achieved by contraction dikes, bank protection, dredging of shoal areas, flattening the curve in several bends in the river or dredging cutoffs, and snagging. The dikes consisted of a double row of staggered piles placed four feet apart and bolted to a center wale between pile rows. Typical of earlier works designed to narrow the channel, they extended out from the banks into the



*Completed pile dikes on the Savannah River. 18 August 1959. (Savannah District, Corps of Engineers)*



*Contractors weaving lumber mattresses for shore protection works on the Savannah River below Augusta. 16 December 1959. (Savannah District, Corps of Engineers)*

channel, causing an increase in the flow of the water that in turn helped to scour the bottom of the river. Bank protection involved grading the slopes of the banks and covering them with wooden woven mattresses weighted down with stone at water level. Riprap then was placed on up the banks. These revetments were placed downstream and opposite the pile dikes to protect the banks from the increased water flow.[46]

Strong's report also proposed that local interests should provide and maintain public terminal and transfer facilities to accommodate some of the expected commerce on the river, as well as provide the necessary rights-of-way and spoil areas. The Augusta Chamber of Commerce later pledged that these requirements would be met.[47] Congress authorized the project modification in the Rivers and Harbors Act of 1950.[48] The Savannah District would continue to operate and maintain the New Savannah Bluff Lock and Dam as part of this project.

Seven years passed before the Corps began working on this improvement project. Congress was largely responsible for the delay in that it failed to fund new work. The lawmakers presumed that the project could be achieved in conjunction with the Hartwell Dam project on the Savannah River, which was awaiting authorization. Moreover, local interests were slow in meeting the obligations of the 1950 act. For example, not until January 1956 did Augusta complete new terminal facilities in line with the requirements imposed by Congress. The Augusta City Council and the Georgia Ports Authority failed to

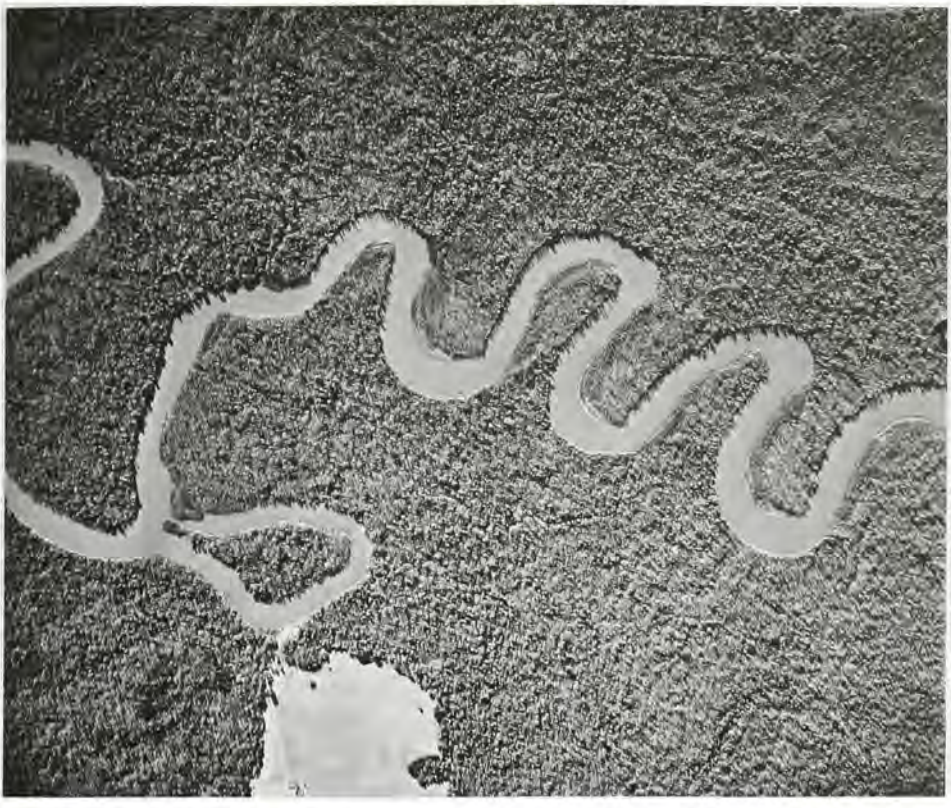
agree on fulfilling other local obligations until August 1957. And the South Carolina General Assembly delayed even later in authorizing the South Carolina Ports Authority to provide necessary lands on the South Carolina side of the river.[49] After Congress funded the nine-foot channel in 1957, the District began to draw up engineering and design plans. Work began in the summer of 1958 with completion anticipated in three to four years.

New work was done largely by contract while maintenance, such as snagging, generally was carried out using government plant and hired labor. In the 1950s the Savannah District used a new snagging technique employed not only on the Savannah River but on the Altamaha system rivers as well. A tractor crane used to lift snags was mounted on the deck of a nonpropelled barge having a three-foot draft. The barge was then maneuvered into place by the towboat *Piasa*. The crane also could be operated from the riverbank. This new technique was cheaper than using the snagboat *Macon*.[50]

The Trans-State Dredging Company did channel and cutoff dredging, and the R.L. Morrison and Son Company and the Mississippi Valley Engineering and Construction Company built the pile dikes and bank revetments. The District also built recreational facilities at New Savannah Bluff Lock and Dam, including picnic tables, fireplaces, restrooms, and trash receptacles as well as signs, markers, and paved roads. This project was finally completed in July 1965. The work took much longer than had been expected because of heavy rain in some



Crane Barge No. 2 *at work in snagging operations, 27 May 1965. (Savannah District, Corps of Engineers)*



*Aerial view of the Savannah River illustrating the winding, twisting channel, 1957. (Savannah District, Corps of Engineers)*

years and slow congressional funding.[51]

In spite of all the Corps' efforts over the decade to provide a navigable channel from Savannah to Augusta, the age-old problems persisted. No new projects were authorized for the river after the nine-foot channel was completed, but maintaining the channel remained a concern for the Savannah District. Year after year contract dredges worked to restore channel depths jeopardized by shoaling. Regular snagging operations also were necessary. The District crane barge *No. 2* and towboat *Piasa* continued to perform snagging operations throughout the 1960s, and the towboat *Tomkins* teamed up with the *No. 2.* in the 1970s. Moreover, through the years the Corps contracted with private companies to build additional bank revetments and pile dikes to help control shoaling. The project depth was maintained 70 percent of the year. The Clark Hill and Hartwell Dams upriver also helped regulate river flow and maintain channel depths.[52] If the water level were not sufficient for a barge and tow on their way to Augusta, a request was sent to Clark Hill Dam to release more water.[53]

The commerce using this section of the Savannah River was limited largely to petroleum products moving upstream and bricks and pipe coming down the river. Therefore, the Corps had to decide if the commercial use of the river warranted its continued upkeep. A 1979 report on maintenance costs recom-



*Dredging cut-off No. 16 as a part of the 9-foot navigation project in the Savannah River below Augusta, 6 October 1960. (Savannah District, Corps of Engineers)*

mended work be confined to operation of the New Savannah Bluff Lock and Dam and snagging operations.[54]

The continued decline in commerce during the 1980s jeopardized the future of the lock. Between 1981 and early 1986, no commercial barge traffic used the lock; no more than 10 to 12 pleasure craft used it during summer months each year, and only one or two in winter months. In January 1986 Colonel Stanley G. Genega, District Engineer, announced District plans to close the lock as part of an economy measure at the end of April. The Corps would continue to maintain the dam and the recreational areas near it, but control of the dam and water levels above it would be by remote control from the Corps office at J. Strom Thurmond (Clark Hill) Dam.[55]

Augusta and Richmond County officials rose in protest to the plan which in effect would cut their community off from Savannah and the Atlantic Ocean by water. Some argued that the Corps' failure to maintain a sufficient channel was the cause of commercial decline which now was used to justify closing the lock. Others complained that closing the lock would result in economic losses to Augusta riverfront development which was already well underway. Just before the closing date, a compromise resolved the conflict. Following a suggestion from the Augusta Port Authority (APA), the Savannah District agreed to operate the lock for another year. It then leased the lock and adjacent recreation areas to the City of Augusta which assumed responsiblity for their operation and maintenance in April 1987. The District continued to operate the dam.[56]

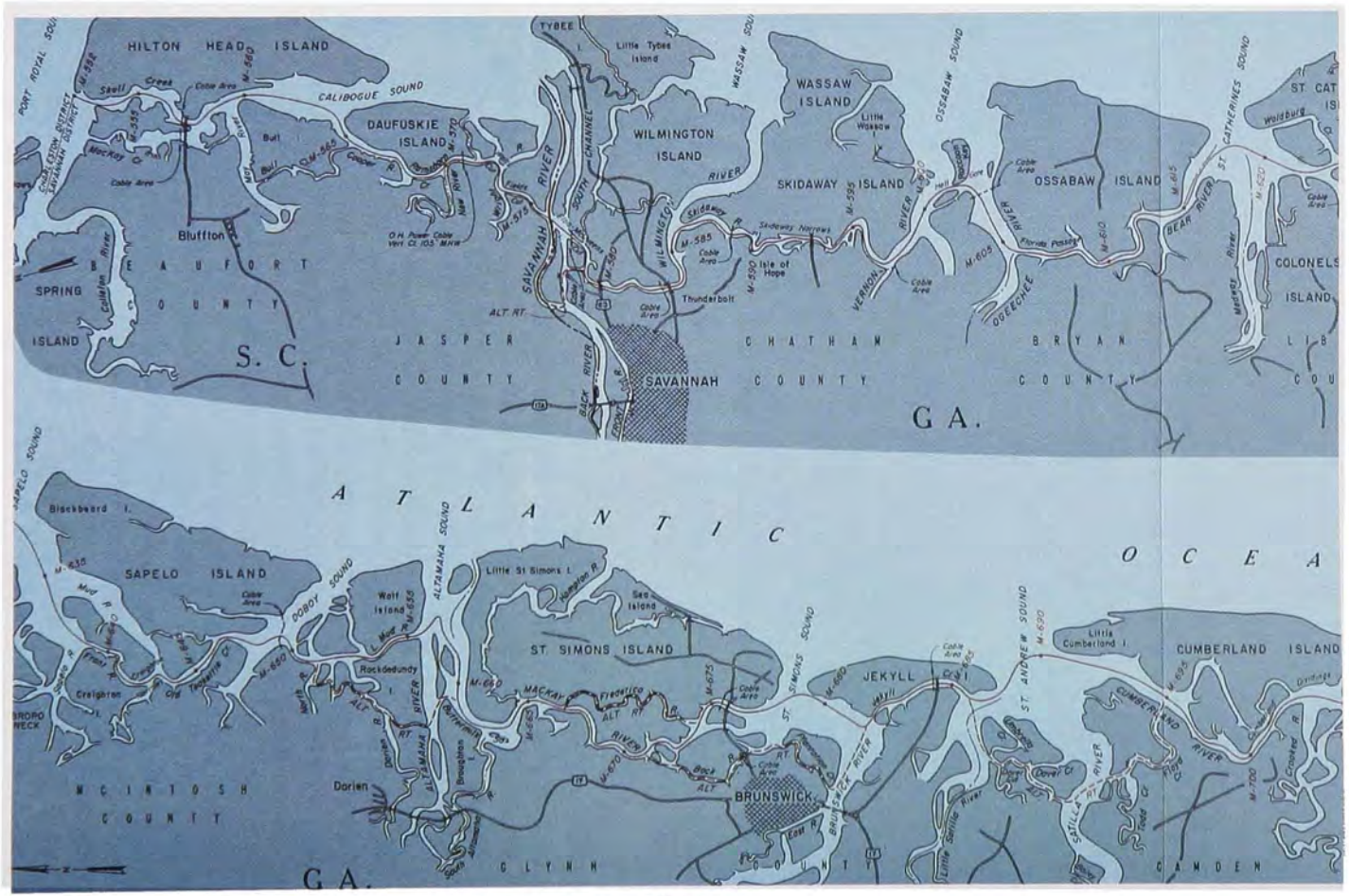


*Towboat and barge loaded with bricks on the Savannah River four miles below Augusta, c. 1960. (Savannah District, Corps of Engineers)*

## INTRACOASTAL WATERWAY

In the last years of the Depression, Congress started focusing on the Atlantic Intracoastal Waterway along the Georgia coast from Port Royal Sound, South Carolina, to Cumberland Sound, Florida. In response to lobbying by commercial interests and pleasure boaters, and following a favorable report by the Corps of Engineers, Congress authorized a 12-foot channel in the 1938 Rivers and Harbors Act. The Savannah District contracted for the dredging of the expanded waterway, which was completed in 1941. The project also included erecting and repairing mileage and direction signs to guide mariners along the route. In the meantime, government plant and hired labor did maintenance dredging in problem areas such as the South Channel of the Savannah River and the nearby Wilmington River.[57]

One provision of the 1938 authorization brought protests from citizens of the St. Simons Island area near Brunswick. The law substituted the MacKay River for the Frederica River as part of the authorized route. The latter river lies along the western side of St. Simons Island. The two rivers flow almost side by side, separated only by marsh. The rivers actually flow together at two places: at the northern confluence just south of Buttermilk Sound and farther south above Lanier Island five miles northeast of Brunswick.[58] The Corps of Engineers had recommended the route change, claiming that when deepened to 12 feet, the MacKay River with its wider and straighter course would be better suited for the




*Atlantic Intracoastal Waterway. (Savannah District, Corps of Engineers)*




*A directional and distance marker on the Atlantic Intracoastal Waterway, 11 October 1940. (Savannah District, Corps of Engineers)*



*Dredging a land cut on the Intracoastal Waterway as part of the project to deepen the channel to 12 feet. 12 October 1940. (Savannah District, Corps of Engineers)*

expected barge traffic. However, over the years St. Simons Island had become a recreation area for yachtsmen traveling the Intracoastal Waterway via Frederica River to and from Florida. The island was noted for its natural beauty, historic sites such as Fort Frederica, and the Frederica and Sea Island yacht clubs. According to District Engineer, Colonel Raymond F. Fowler, traffic on the Frederica River, "particularly that of pleasure boats, has been one of the main factors in the development of St. Simons Island from a locality of farms and fishermen to a recreation area catering to a high class of visitors."[59]

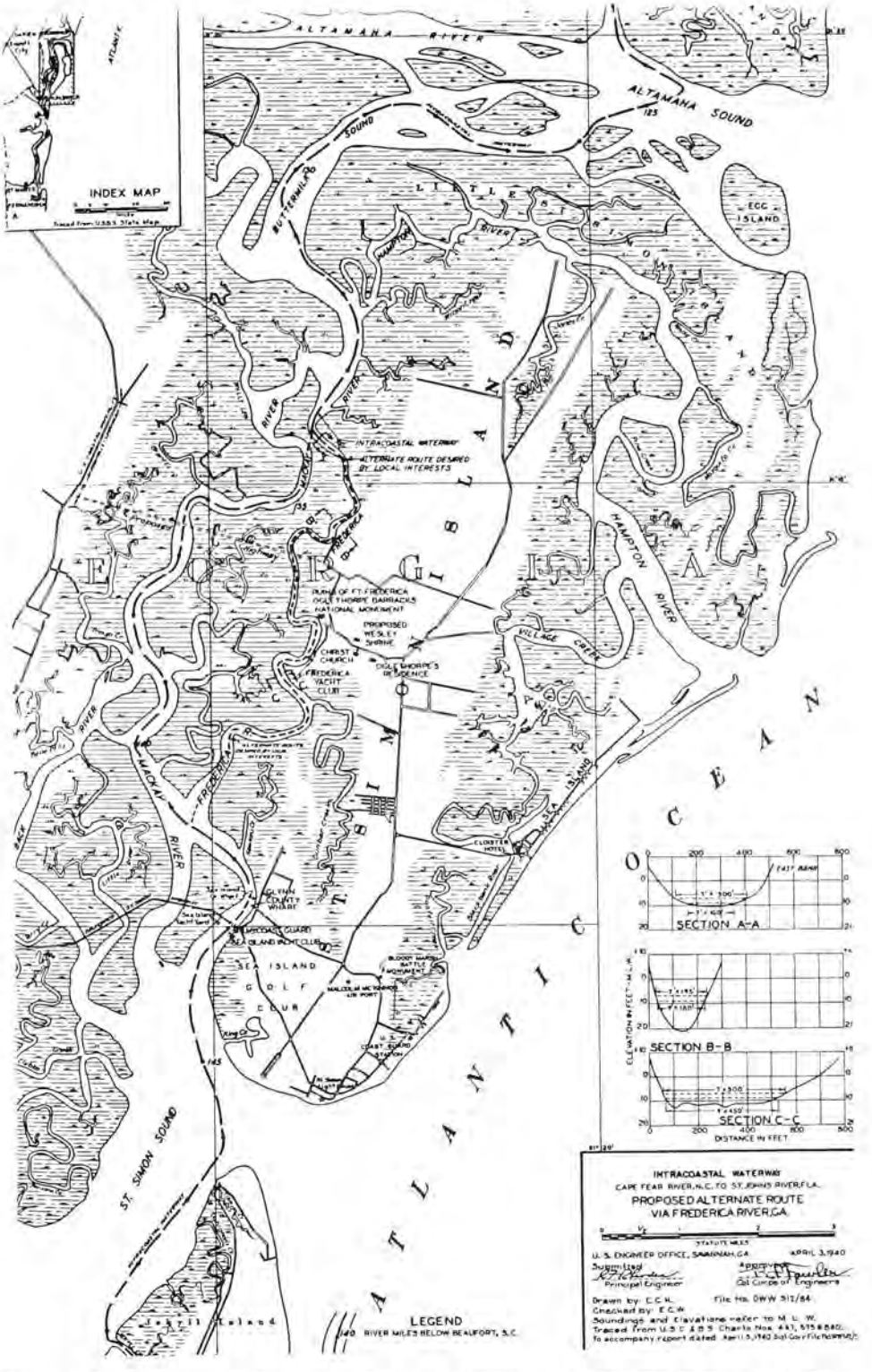
Local interests feared that removing the Frederica River from the authorized route would cause yachts to bypass St. Simons and "the improvements that have been made to cater to this class of tourists would lose business." Thus they called on Congress to designate Frederica River as an official alternative route of the Intracoastal Waterway. Colonel Fowler noted that Frederica River had a natural depth of 9 feet and needed no maintenance dredging. Therefore designating the river as an alternative route would cost the Federal Government nothing. The District Engineer formally recommended the alternative status, stipulating a depth of 9 feet and a width of 150 feet, which Congress included in the Rivers and Harbors Act of 1945.[60] The designation, however, applied only to the Frederica River north of Lanier Island; that section of the river between Lanier Island and St. Simons Island all the way to St. Simons remained a part of the authorized route.

The 12-foot channel was completed by the time the United States entered World War II, and the enlarged passage along the Georgia coast benefited not only the State but the whole eastern part of the nation. Commercial tonnage on the waterway more than doubled between 1942 and 1944, rising from 426,851 to 962,921 tons. Much of the tonnage was in petroleum products, particularly gasoline, much of it bound for the northeastern seaboard.[61] German submarines preyed on ocean tankers moving up and down the coastline, and the Intracoastal Waterway and barge carriers offered a safe alternative route.

The 1938 legislation permitted the Corps to make cutoffs or other changes in the route considered to be beneficial to navigation. In March 1943 the Engineers completed the Elba-McQueens Island Cut, more directly linking the Savannah River and St. Augustine Creek. The previous route had passed through the western end of the South Channel of the Savannah River and the northern end of the Wilmington River. This former route initially was abandoned by the Corps after completion of the Elba-McQueens Island Cut, but the District later began to maintain it at the 7-foot depth.[62]

Since World War II the Savannah District's responsibility for its section of the Intracoastal Waterway largely has involved only maintenance dredging at certain trouble spots along the route. Areas where shoaling has required regular Corps attention include the Wilmington River near Savannah, Buttermilk Sound, and Jekyll Creek. In the late 1940s, maintenance dredging was carried out by hired labor working on government plant, but in the following decades the District Office relied primarily on contractors. During the early 1970s, the dredging contracts were combined with contracts for maintenance work in Brunswick Harbor. On occasion the Corps also carried on snagging operations and built spoil dikes in the waterway using government plant and hired labor.[63]

In the years following World War II, the importance of the Intracoastal




*Map of the Intracoastal Waterway showing the proposed alternate route via the Frederica River north of Lanier Island, 3 April 1940. (H. Doc. No. 114, 77th Cong., 1st Sess.)*



*Commercial tow of sections of a pipeline and dredge on the Intracoastal Waterway near Wilmington Island, Georgia, 17 March 1966. (Savannah District, Corps of Engineers)*



*Shrimp boats on the Intracoastal Waterway, 1980. (Savannah District, Corps of Engineers)*

Waterway in Georgia decreased. In fact, one student of the project declared that it "never has been the highly significant route of commerce which its early proponents had hoped it would be."[64] In recent years the waterway has been used primarily by pleasure craft cruising to and from Florida, as well as by commercial fishing vessels. Recent studies have shown that the vast majority of vessels using the waterway draw less than 6 feet of water, suggesting that maintenance of the 12-foot depth is not necessary.[65] The Savannah District began a Maintenance Program Evaluation of the Intracoastal Waterway in 1979. Finished in FY82, the study concluded that traffic on the Atlantic Intracoastal Waterway section in Georgia did not warrant maintaining the 12-foot project depth. The District recommended that only minimum funding be provided for limited work on this project.[66] In 1989 the depth in some areas was less than 7 feet, but the District had no complaints from shippers.[67]

**ALTAMAHA RIVER SYSTEM**

Improvement of navigation on the rivers of the Altamaha system — the Altamaha, Oconee, and Ocmulgee Rivers — had been done to meet a generally local need, an action characteristic of an earlier generation of Corps work in the Savannah District. The specified 3-foot depth had been achieved before World War I through the removal of rock shoals and sandbars, construction of contraction works and bank protection, snagging, and closing of cutoffs. However, due to the nature of the work required, the District Engineers never declared the project complete. It was, moreover, one of those smaller projects that com-



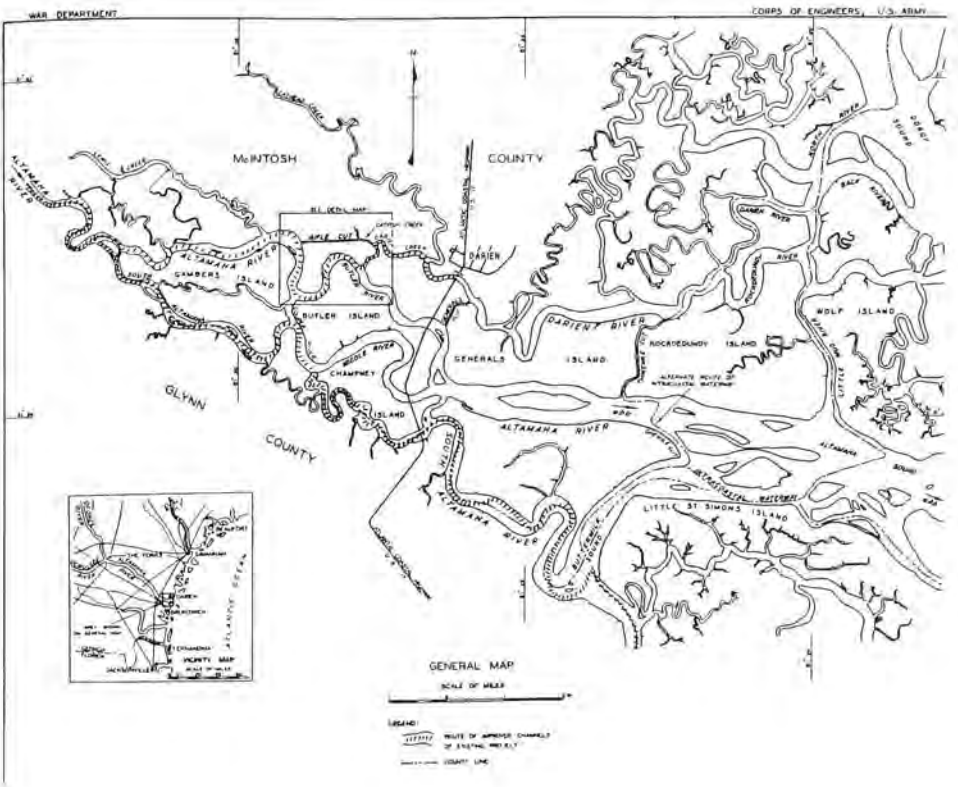
*An example of a permeable pile dike built on the Altamaha River by contract with the C. Y. Thomason Company. Such structures were used for channel contraction. 3 October 1940. (Savannah District, Corps of Engineers)*

manded less and less attention from the Corps, particularly in view of the decline in commerce using the rivers during the early years of the Depression.

Local interests continued to push for improvements, particularly those living in McIntosh County at the mouth of the Altamaha River. Of special interest to these people was that section of the river just above the town of Darien. Though never specified as such, the project of improvement in the lower Altamaha River had followed a route from Darien up Darien River to the junction of Darien Creek and Cathead Creek; up Darien Creek to the Butler River and along that river to its junction with the north branch of the Altamaha; and up the north branch to the point where it joins the south branch of the Altamaha to form the main river. Commerce coming down the river followed this route, which was considered difficult due to shoaling in the Butler River. However, Rifle Cut, an old cut dug in 1819, connected the north channel with Darien Creek and Darien River via Catfish Creek. If improved, Rifle Cut would allow vessels to bypass the longer and more difficult established route.[68]

Local interests persisted in their calls for improvements to this bypass route, and between 1925 and 1936 Congress called on the Corps to survey this passage. In each of its four reports, the District recommended against any improvements. Supporters of the idea wanted a four-foot channel developed from the Altamaha River through Rifle Cut on to the wharf at Darien, but District Engineer Colonel Creswell Garlington, in 1936, maintained that the project would have little effect on the industrial development of the area and would be used mainly by fishermen. The benefits would not justify the costs.[69] Statistics indicating an increase in commerce bolstered the case for Rifle Cut by 1940. Traffic on the Altamaha increased from 41,367 tons in 1935 to 92,235 tons in 1939. Likewise, the statistics for Darien Harbor showed significant increases in trade there. The Corps finally undertook some snagging operations on the cut under authority of the 1930 Rivers and Harbors Act, which permitted the Chief of Engineers to order obstructions removed from tributaries of waterways already under U.S. Government improvement at costs not to exceed $1,000 a year per tributary.[70]

In early 1941 the House Rivers and Harbors Committee required the Corps to review the project once more after local advocates called for dredging a channel through Rifle Cut 5 feet deep at low water and 50 to 75 feet wide. Proponents claimed that in addition to enhancing commerce, the improved cut would increase water flow through Darien River and Darien Harbor, and thus reduce shoaling there. However, Colonel Altstaetter, back from retirement to fill the District Engineer's post, reported that the benefits to the timber, pulpwood, and fishing industry of the area would not justify even the estimated $3,000 to $3,900 annual costs of the improvement. He also discounted the advantages of an increased water flow through Rifle Cut in helping to maintain depths in Darien Harbor. Altstaetter, however, did advocate a cleanup of the existing waterway by removing submerged obstructions and cutting overhanging trees, asserting that such work would open a shorter and better passage between Darien and the Altamaha River for pleasure craft. Local interests were required to provide the Government with a 200-foot wide right-of-way along the route of the cut.[71] On 2 March 1945 Congress authorized the improvement as a modification of the Altamaha, Oconee, and Ocmulgee Rivers project.[72]




*Map of the lower Altamaha River and Darien Harbor showing the project modification for improvement of Rifle Cut as authorized in the River and Harbor Act of 2 March 1945. (H. Doc. No. 610, 77th Cong., 2d Sess.)*

McIntosh County officials provided the right-of-way lands to the Corps by fall 1946, and the next several weeks saw the U.S. snagboat *No. 1* in operation along Rifle Cut.[73] During the postwar years the snagboat *Macon* also carried out snagging operations along the Altamaha River. By 1950 the District ceased all maintenance operations, and as of 1952 the project was dropped from the *Annual Reports.* District Engineer Colonel Thomas DeF. Rogers stated in the *Annual Report* for 1955 that maintenance dredging had been done again on the Altamaha System. No work was done in 1956. The channel was considered adequate for the navigation needs at that time even though the controlling depth on the Altamaha River was 3 feet or more only 50 percent of the time, that on the Oconee River from the Forks to Dublin was 3 feet or greater 60 percent of the time, and that on the Ocmulgee River from the Forks to Abbeville was only 2.5 feet or greater 50 percent of the time. Moreover, during the low-water months from August to November, the depths were as much as 1 foot less in these rivers.[74]

Over the next three decades the Savannah District gave the rivers of the Altamaha System limited attention. No commerce was reported on the Ocmulgee and Oconee after 1943. That on the Altamaha was limited each year to a few



*Snags and logs along the banks of the Altamaha River. Such hazards were typical of the various rivers under improvement by the Savannah District, and their removal was a constant focus of Corps activity. 1954. (Savannah District, Corps of Engineers)*



Crane Barge No. 2 *at work snagging on Generals Cut near Darien. 1965. (Savannah District, Corps of Engineers)*

thousand tons of sand, gravel, or logs. Commercial traffic ceased altogether after 1975.[75] Beginning in 1959 the Engineers had carried out snagging operations periodically on the Altamaha and Ocmulgee Rivers, using hired labor on the crane barge *Annual Report* and on the towboats *Piasa* and *Tomkins*. But even this activity waned during the 1970s. The District began a reconnaissance study of this river system in 1979 and concluded that the waterway warranted only limited funding for snagging operations.[76] The District carried out the last such operations in February 1979.[77]

Both Darien and Sapelo Harbors, two of the Altamaha River's outlets to the ocean, remained among the District's authorized navigation projects. However, only Darien Harbor received any Corps attention in the post-World War II years because Sapelo Harbor had been recommended for abandonment in 1926. The Savannah District Engineers executed a survey of Darien Harbor to determine how much the harbor had shoaled over the decades. The District reported that as of 1948 the controlling depth was 10 feet at mean low water. The District thus requested no funds for new maintenance.[78]

In 1968 the Corps finally contracted for maintenance dredging work in Darien Harbor, the first since 1923.[79] Similar work was carried out again in 1974 as part of a combined contract for Darien Harbor, the Atlantic Intracoastal Waterway, and Brunswick Harbor.[80] Although a new survey to consider navigation improvements for the entire river system plus Darien Harbor was authorized in the early 1970s, lack of funding has postponed this activity.[81] The rivers now served only pleasure boaters and sportsmen, and Darien Harbor provided a base of operation for commercial fishermen.

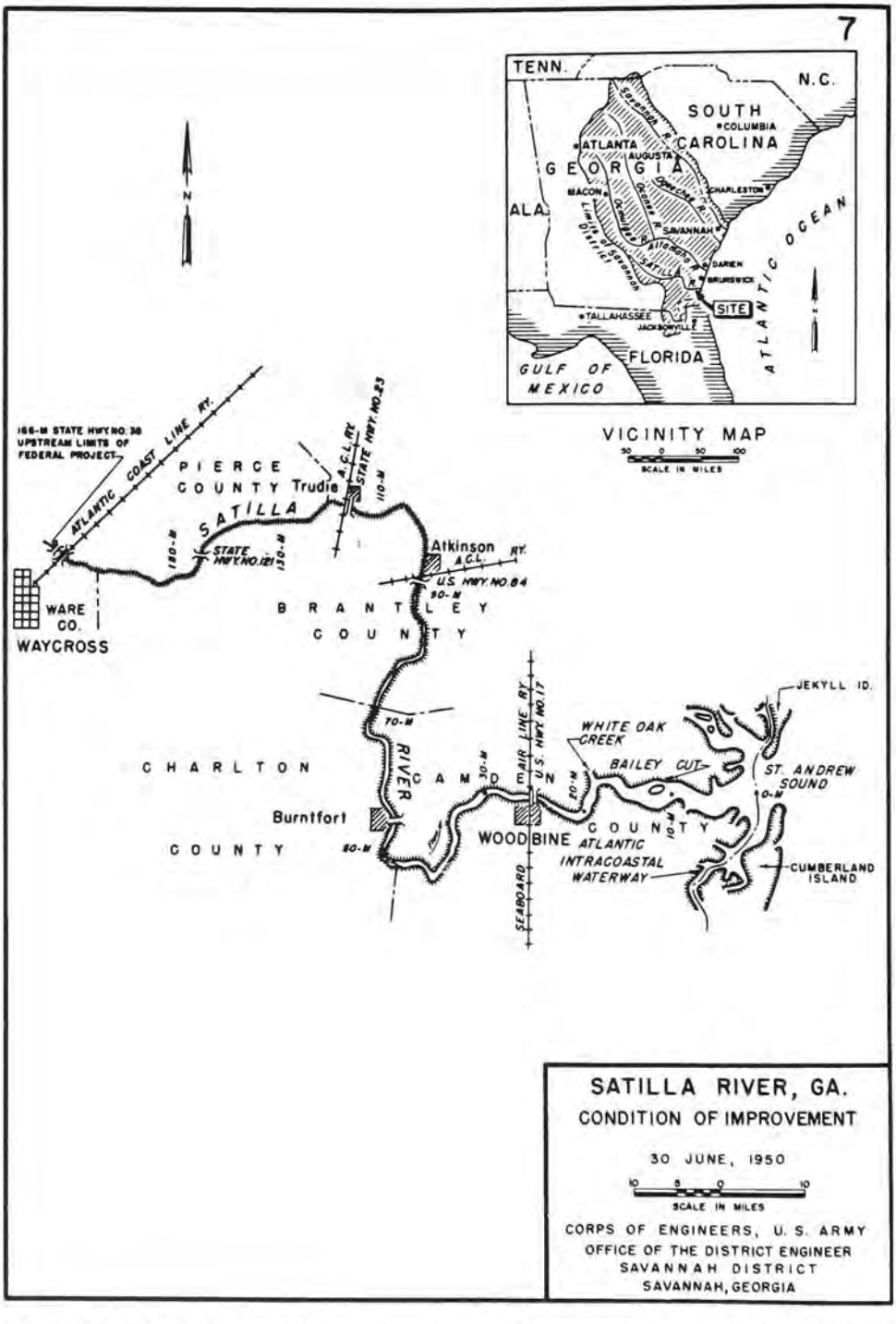
**SATILLA RIVER**

Unlike several of the other smaller navigation projects of the Savannah District that in the post-World War II era saw some revival of local attention, Corps restudy and maintenance, and even congressional authorization of project modifications, the Satilla River project continued to decline in significance in the 1940s. The river connected no major inland town with the coast, and had no port city or town at its mouth. No industry had located adjacent to its channel, and the timber interests that once had championed its cause were no longer as important. The river carried a low figure of 4,866 tons of commerce in 1943 and a high of only 22,714 tons two years later. No timber was rafted down the river after 1941. Such statistics were no match for the river's record 121,098 tons in 1913.[82]

Just before World War II the Savannah District did some limited maintenance dredging on the Satilla with the U.S. snagboat *No. 1,* but even that activity ceased after the war. As of 1952 the project was dropped from the District Engineer's reports except to be listed annually as an inactive navigation project whose channel was adequate for the commerce using it.[83] The latest survey information of that period stated the depth from the mouth of the river to Woodbine to be 19 feet; from Woodbine to Owens Ferry, 8.8 feet; from Owens Ferry to Burnt Fort, 4.5 feet; and from Burnt Fort to Waycross, the official head of navigation, about 1 foot.[84]

The Satilla River carried only limited commercial traffic over the years, and none was reported for 1975, 1977, 1978, and 1979.[85] However, local interests

sought a new study as late as 1969, hoping that renewed development of the river basin would improve the economic development of extreme southeast Georgia. Data collected showed "very little justification for this project."[86]




*Map of the Satilla River showing conditions of improvement as of 30 June 1950. (Savannah District, Corps of Engineers)*

## ST. MARYS RIVER AND NORTH RIVER

The project to improve navigation on the St. Marys River was completed in 1914 but later faded in importance. The Corps of Engineers performed limited maintenance dredging until 1923 and periodic snagging activity up through the Depression years. While new industry in the area seemed to portend a renewal of work on the St. Marys River, in reality it only postponed the inevitable.

In 1941 the St. Marys Kraft Corporation Mill, an affiliate of the Gillman Paper Company, began operations in the town of St. Marys on the North River. This mill manufactured pulp paper and board, which it then shipped north. It also imported chemicals and Scandinavian pulp for use in its own production. The Union Bag and Paper Corporation in Savannah owned extensive forest lands along the St. Marys River and barged pulpwood from these holdings to the Savannah plant via the river and the Intracoastal Waterway. The St. Marys Railroad linked the town with the Seaboard Air Line Railway at Kingsland 11 miles away and planned to extend its rails to Folkston to connect with the Atlantic Coast Line Railway there. A commercial fishing fleet operated out of St. Marys and offered its own potential for economic growth in the area.[87]

These local business interests called for an expanded St. Marys River project to include a ship channel 25 feet deep from the river's mouth up to the mouth of the North River and up this river to the wharf of the St. Marys Kraft Corporation, with a turning basin near the wharf. (At that time there was no U.S. Government project to improve the North River.) These same interests also sought a ship channel on the St. Marys River 20 feet deep from the mouth of the North River up to the town of St. Marys and an 8-foot barge channel up the St. Marys between Crandall and Traders Hill. Their proposal included straightening the river channels by cutoffs to facilitate navigation. At that time, ocean-going vessels could not reach the pulp mill terminals because of inadequate depths in the North and St. Marys Rivers as well as a sharp bend in the former.[88] Congress called on the Corps to carry out a preliminary examination and survey of both rivers.[89] The Savannah District was instructed to review the project in terms of flood control, power, and irrigation as well as navigation, a reflection of the growing Corps interest in total river basin development.[90]

Colonel Paschal Strong, District Engineer, submitted the report in July 1946. He discounted any need for irrigation or flood control activities. Moreover, he concluded that any hydroelectric power development would be impractical because costs would far exceed benefits. Strong's recommendations for navigation improvements, however, went beyond the requests of local interests. The desired 25-foot channel, he maintained, was not deep enough to meet the needs of deep-draft vessels serving the St. Marys Kraft Corporation plant. He proposed a channel 28 feet deep, because this was the depth of the Cumberland Sound channel, all the way through the St. Marys and North Rivers to the plant's wharf. His proposal also specified a channel width of 200 feet, a turning basin near the wharf, and a cutoff in the North River. He opposed deepening the St. Marys River on to the town of St. Marys from 17 feet to 20 feet as being unnecessary, but recommended the 8-foot barge channel between Crandall and Traders Hill, seeing it as beneficial to the barging of pulp wood downriver.[91] The project depth between St. Marys and Crandall would remain at 14 feet, as recommended by the Corps in 1927.

Reminiscent of the days when the Corps first considered improving the St. Marys River, the Board of Engineers for Rivers and Harbors balked at the recommendations. The board concluded that "the benefits appeared to be largely local in nature." Further investigation of local needs and interests, however, later convinced the board to support Colonel Strong's recommendations.[92] Congress authorized the project modification in May 1950.[93]

Despite the Corps' recommendations, in 1952 the St. Marys and North Rivers project was dropped from the *Annual Report* and listed as an inactive project. By the end of the 1950s it was moved to the status of "deferred for restudy," but the restudy never came. The project modification authorized in 1950 was finally deauthorized in August 1977 in accordance with Section 12 of the Water Resources Act of 1974, which permitted the deauthorization of projects that had not received appropriations in at least 8 years. An operation and maintenance study, however, was conducted in 1980.[94]

**FERNANDINA HARBOR**

The Savannah Engineers completed a major project modification in Fernandina Harbor in May 1940. Two years earlier the Corps had begun the project to provide a channel 28 feet deep from deep water in the Atlantic to the junction of Lanceford Creek and the Amelia River, with widths of 400 feet up to Calhoun Street in Fernandina and 300 feet from Calhoun Street on to the project's end. Moreover, the channel was to be widened to 1,000 feet at the first bend below Lanceford Creek to provide a turning basin. In fact, the basin as dredged was only 800 feet wide.[95]

Hardly was this latest harbor improvement completed before Fernandina civic and business officials began calling for a channel 30 feet deep. Spokesmen for two pulp mills in the city asserted that their businesses would be better served by a harbor that could accommodate vessels drawing more than 28 feet. Moreover, a company reported to be involved in manufacturing projects necessary for national defense was expected to locate in Fernandina. The House Committee on Rivers and Harbors instructed the Corps to review the project in light of these new interests, and Major Girard B. Troland, District Engineer in Savannah for only four months in 1940, made the subsequent report.[96]

Troland opposed any deepening of the harbor. Because the defense establishment had decided not to locate in Fernandina, the justification for improvement was tied solely to the needs of present shippers. In addition, the costs of the work were not justified by the benefits to be derived by these existing companies. Troland did, however, recommend that the channel line opposite the Rayonier Company terminal be moved 50 feet to the northwest. This company already had War Department permission to extend its wharf farther into the harbor. This extension would be right at the edge of the present channel and as such would be exposed to possible damage by future Corps maintenance operations. Moving the channel line as proposed would eliminate this threat. The District Engineer also recommended that the area, dredged to a depth of 28 feet by Rayonier opposite its wharf, be included in the official project at no additional costs. Finally, he suggested that the 1,000-foot width of the turning basin as provided for in the current project be reduced to 800 feet, the width already established and considered adequate for the needs of the largest ships using

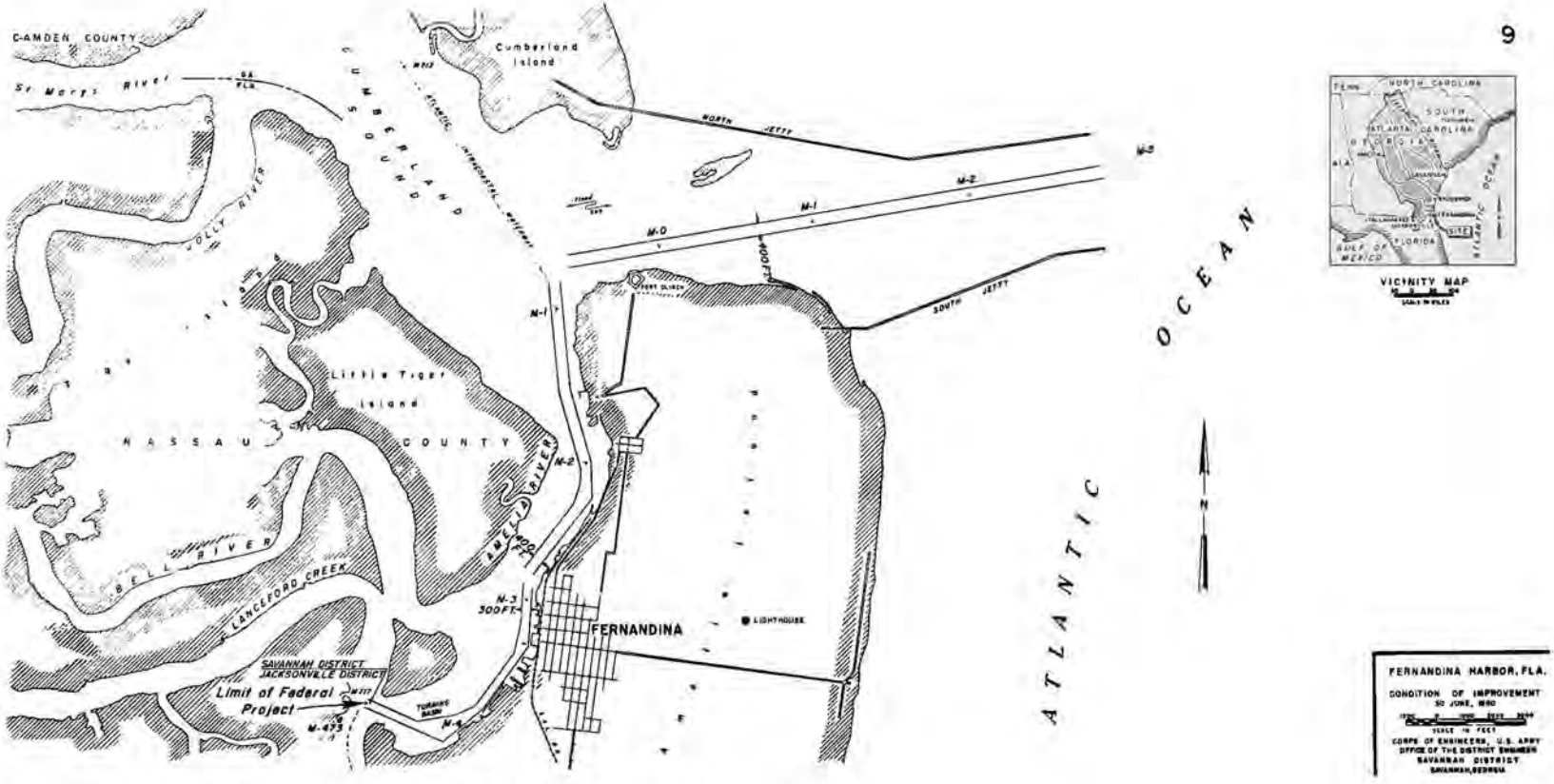
Fernandina Harbor.[97] Following approval of the recommendations by the South Atlantic Division Engineer, the Board of Engineers for Rivers and Harbors, and the Chief of Engineers, the report was submitted to Congress by Secretary of War, Henry L. Stimson, in June 1941. However, Congress did not authorize the project changes until passage of the Rivers and Harbors Act of 1945.[98]

That same year the House Committee on Rivers and Harbors asked the Corps to review the project for Fernandina Harbor again in light of renewed requests from local interests for a deeper channel. This time they wanted a 32-foot depth. Local citizens also were citing the twin jetties at the entrance to the harbor as the cause of Amelia Island beach erosion. They called for shore-protection works and raising the south jetty to the project height of six feet above mean low water. A survey in December 1945 revealed that the crest heights of the south jetty ranged from 1.5 to 9.0 feet above mean low water.[99] The jetties had not been repaired since 1927.

Colonel Wilson B. Higgins, District Engineer, made his report in May 1946. He agreed that the present depth of Fernandina Harbor was inadequate for prospective commerce. Tonnage for 1940, 1941, and 1942 had increased significantly over that of the Depression years, although war conditions in 1943 and 1944 had caused a decline in fuel oil shipments into the harbor. Tonnage increased considerably in 1945, however. Shipping and industrial interests, insisting on the value of the greater depth to their expanding business, won the support of the District Engineer. Moreover, Higgins acknowledged that ships were indeed increasing in size. He wrote, "As the large vessels are more economical to operate, they are still being built, and smaller vessels which might use the present channels with little delay will not be available in the future." Thus he acknowledged the need for a 32-foot depth at mean low water in both the harbor channel and the turning basin.[100]

The District Engineer, however, did not support the charge that the jetties had caused beach erosion on Amelia Island, nor did he agree that the Corps should do repair work on the south jetty or construct shore-protection works. Typical of the District's response to the charges made by Tybee Island residents concerning beach erosion at the entrance to Savannah Harbor, Colonel Higgins declared that such erosion resulted from natural forces such as tides and currents. He cited Shore Protection Board studies, which concluded that the beach actually had increased in size since the jetties had been built. The fact was that the erosion had resulted from a hurricane in October 1944, which seriously damaged the shoreline and the property along it.[101] Congress incorporated the District Engineer's recommendations for the 32-foot harbor channel in the Rivers and Harbors Act of 1950.[102]

While Congress and the Corps planned the Fernandina Harbor development, the Engineers also carried out maintenance dredging using government plant and hired labor on a regular basis. However, new work did not begin immediately following passage of the 1950 law. Year after year the District Engineer reported that no work was done except for some maintenance dredging in 1955. Finally, the harbor was listed as a project deferred for restudy. The outer harbor through Cumberland Sound was deepened in 1957 to 34 feet, but not as a result of Corps efforts. The Army Transportation Corps enlarged that channel as part of a waterway leading through the mouth of the St. Marys River and up the




*Map of Fernandina Harbor, 1950. (Savannah District, Corps of Engineers)*

Intracoastal Waterway west of Cumberland Island to what was then the Kings Bay Army Terminal and later the Kings Bay Submarine Base.[103]

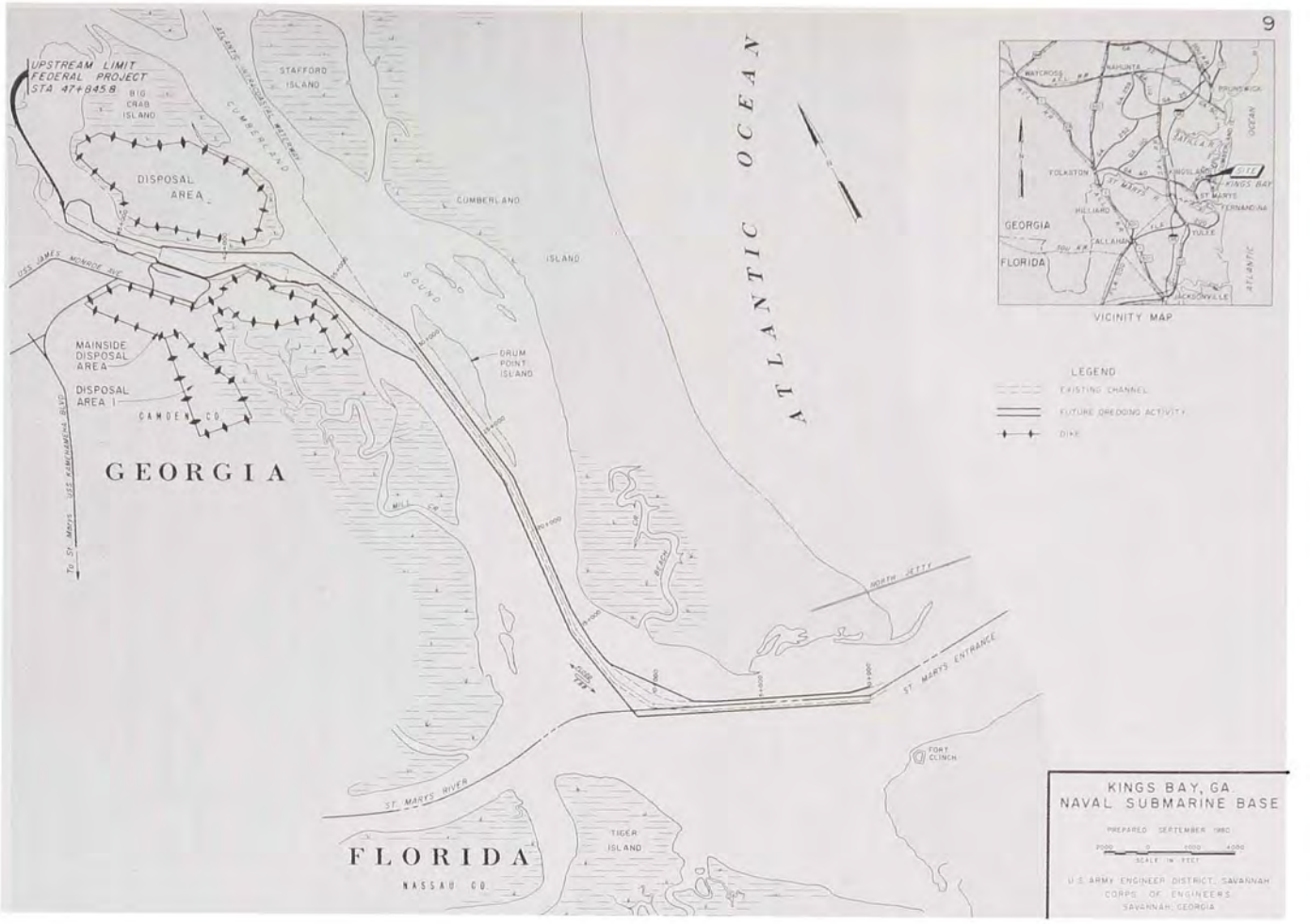
The lack of Corps activity on this authorized project was explained in terms of the miscalculation regarding the projected water traffic, which obviated the need to achieve the 32-foot depth. Also, as one observer noted, "Phosphate, the bulk commodity that had for years gone a long way to justifying the Fernandina Harbor work, was gone."[104] The pulp mills of the area could not make up the losses plus provide the additional tonnage needed to justify the new work. The 1950 project authorization was subsequently inactivated, and the Corps returned to the project definition as included in the 1945 Rivers and Harbors Act.

The Corps failed to maintain even the 28-foot depth as specified originally. A March 1962 survey showed that the inner harbor had a controlling depth of only 23 feet, while in the area of the Rayonier wharf to Lanceford Creek the controlling depth was only 13.5 feet.[105] In the next few years, however, the District Office carried out maintenance dredging in the inner harbor and turning basin by contract, and in the outer harbor with the U.S. hopper dredges *Gerig* and *Hyde*. By 1966 the controlling depths were 34 feet in the five miles of the outer harbor and 35 feet in the two-mile stretch of inner harbor.[106] In October 1966 the Fernandina Harbor project was transferred to the Jacksonville District in a move to align the boundaries between the two Districts along state lines.[107] A project that the Savannah District had supervised for more than 130 years was now another District's responsibility.

**KINGS BAY CHANNEL**

The Army never made operational the Kings Bay Army Terminal, constructed adjacent to Cumberland Sound in the late 1950s, and the 34 foot channel dredged through the sound and the mouth of the St. Marys River into the Atlantic. The facility was in only a "standby mobilization status" until 1978 when the Army transferred the site to the Department of the Navy for use as a base for a squadron of Poseidon submarines being moved from Spain. The Navy turned to the Savannah District to design the new ranges and turning basins, and both the Savannah and Jacksonville Districts dredged in the channel, widening it and taking it to a depth of 38 feet, mean low water. The 15.5 mile project was completed in May 1979.[108]

In 1980 the Navy chose Kings Bay to be the east coast home of the larger Trident-class submarines newly authorized by Congress. These vessels needed a deeper channel, and the Navy turned to the Savannah and Jacksonville Districts again to dredge the necessary 42 foot depth and 500 foot width. It was an enormous and exceedingly arduous project that began in 1982. The dredging contractors removed approximately 35 million cubic yards of sand and rock, enough to cover a football field with a pile of spoil 3.75 miles high, according to one account. The dredges encountered an excessive amount of rock, and one contractor lost a dredge in bad weather. The project was finally completed in October 1988.[109] The natural condition of the channel, however, necessitated annual maintenance dredging by the Corps as requested by the Navy Department.


UPSTREAM LIMIT
FEDERAL PROJECT
STA 47+845.8
BIG CRAB ISLAND
DISPOSAL AREA
ATLANTIC INTRACOASTAL WATERWAY
STAFFORD ISLAND
CUMBERLAND
CUMBERLAND ISLAND
SOUND
USS JAMES MONROE BLVD
MAINSIDE DISPOSAL AREA
DISPOSAL AREA I
CAMDEN CO
GEORGIA
To St. Marys
USS KAMEHAMEHA BLVD
DRUM POINT ISLAND
ATLANTIC OCEAN
NORTH JETTY
ST MARYS ENTRANCE
FORT CLINCH
ST MARYS RIVER
TIGER ISLAND
FLORIDA
NASSAU CO
VICINITY MAP
WAYCROSS
NAHUNTA
BRUNSWICK
OCEAN
ATLANTA
FOLKSTON
KINGSLAND
SITE
KINGS BAY
ST MARYS
FERNANDINA
WILLIAMS
GEORGIA
FLORIDA
TALLAHASSEE
TULSE
ATLANTIC
JACKSONVILLE
LEGEND
EXISTING CHANNEL
FUTURE DREDGING ACTIVITY
DIKE
KINGS BAY, GA.
NAVAL SUBMARINE BASE
PREPARED SEPTEMBER 1980
SCALE IN FEET
U.S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA



U.S.S. Tennessee, *the first Trident submarine to arrive at Kings Bay and use the channel dredged by the Savannah District, 1989. (Savannah District, Corps of Engineers)*

**SECTION 107 PROJECTS**

In 1960 the Corps of Engineers was given authority from Congress to study and carry out small navigation improvement projects without specific authorization. Historically, the Corps acted on projects only as directed by Congress, but Section 107 of the 1960 Rivers and Harbors Act gave the Corps power to act on its own in certain cases where such improvements would not cost the Federal Government more than $1 million, would be complete in themselves, and would not require further Federal improvements.[110] This provision was amended in Section 131 of the Water Resources Development Act of 1976, limiting the federal share to $2 million.[111] The Corps procedure regarding the "107 projects" included preliminary or reconnaissance studies that, if positive, were followed by detailed project studies. Favorable reports on project studies then led to approval and execution of the project.

The Savannah District became involved in 107 projects in Georgia during the 1970s. One study of the Wilmington River bar channel near Savannah resulted in a negative report in 1976, as did a later study of suggested improvements of Jekyll Island Marina in 1982.[112] The District also studied problems in Lazaretto Creek near Savannah, where shrimpers were plagued by shoals. However, the Corps ended the study in July 1981, declaring that "no economically and environmentally justifiable solution was found."

The District gave much attention to small-scale improvements in coastal McIntosh County near Darien. Commercial fishing and shrimping were important to the economy there, but shoaling in channels leading to four small fishing ports jeopardized the industry. The District carried out preliminary and detailed project studies on proposed construction of navigable channels from



*View of Meridian Harbor, Georgia, 1981. (Savannah District, Corps of Engineers)*

the Atlantic Intracoastal Waterway via several small coastal rivers and creeks to Bellville Point Harbor, Cedar Point Harbor, Valona Harbor, and Meridian Harbor.

In 1982 the Engineers completed the Cedar Point project, which involved work on a channel 10 feet deep, 100 feet wide, and 7,600 feet long in Crescent River and Cedar Creek, at a cost of $656,233. However, that same year the Corps rejected the proposal for Meridian.[113]

The District in 1984 completed the detailed project report for Bellville Point Harbor in which Colonel Dan Christman recommended construction of a small craft navigation channel in the Sapelo River. As in the case of much larger projects such as Savannah Harbor and Brunswick Harbor, this little project was caught in the local cost-sharing conflict of the mid-1980s, but finally Federal funds underwrote the entire cost of $183,640; the project was completed between 10 April and 30 April 1986.[114] The study of Valona Harbor and a channel via Shellbluff River was still underway at the end of 1989.

Another 107 project of the Savannah District concerned the route of the Atlantic Intracoastal Waterway near Brunswick. After 1938 the designated route of the waterway in that area included the MacKay River, although Congress did authorize the Frederica River as an alternative route in 1945. However, as previously noted, the Frederica River flowing between Lanier Island and St. Simons Island remained part of the authorized route. Furthermore, a vertical lift bridge, part of the Torras Causeway linking Brunswick to St. Simons Island via Lanier Island, had been constructed over the Frederica. In the late 1970s the Georgia Department of Transportation began planning to widen the Torras Causeway to four lanes. Citing the environmental impact on the Frederica

River, the DOT determined that the new bridge should be located over the MacKay River. As a result, the Savannah District in July 1981 completed a study to determine the feasibility of directing Intracoastal Waterway traffic through the MacKay River west of Lanier Island. The Corps recommended that craft be redirected through this section of the MacKay River, and thus sanctioned placing the four-lane high-level bridge over the MacKay.[115] The relocation was completed in 1985 upon completion of the new Torras Causeway.

Although Brunswick Harbor was the focus of a major feasibility study in the late 1980s, the GPA, the Brunswick Bar Pilots Association, and other shipping interests in Brunswick claimed that the widening of the South Brunswick River section of the harbor project could not wait for completion of this study. The safety of vessels calling at the Colonel's Island was an critical matter demanding urgent attention of the Corps of Engineers. Since there is no turning basin in the South Brunswick River above the port facility, ships were turned around in a naturally deep area at the lower end of the channel and backed up to the terminal, thus reducing their maneuverability and exposing them to significant danger. This process was also time consuming and thus added to shipping costs. Therefore, the feasibility study of widening the South Brunswick River channel was removed from the main study and carried out as a Section 107 Small Navigation Project. The Savannah District completed a Detailed Project Report in January 1989 in which Colonel Ralph Locurcio recommended widening this part of the authorized harbor from 300 feet to 400 feet. He also recommended construction of a turning basin at the confluence of the South Brunswick River and Turtle River to be used in place of the natural turning area. He stated the benefit-cost ratio to be 3.25 to 1.[116] Construction was scheduled to begin in 1990.

# 15 FLOOD CONTROL, THE GREAT DAMS, AND MULTIPURPOSE RIVER BASINS DEVELOPMENT

As noted earlier, the first District Engineer in the Savannah office, Lieutenant Oberlin M. Carter, stated in an 1890 survey report that the flood problem in Augusta could be solved only through a system of restraining reservoirs created by dams constructed on the upper tributaries of the Savannah River. This recommendation went unheeded, however, until the 1927 Rivers and Harbors Act authorized the Corps of Engineers to investigate existing and prospective development on various streams throughout the nation for purposes of navigation, power development, flood control, and irrigation. This authorization was embodied in House Document 308, 69th Congress, 1st session. Therefore, the reports submitted to Congress as a result of the act generally were known as the "308 reports." The Savannah District Engineer completed such a report on the entire Savannah River Basin in May 1933. This document recommended against any U.S. Government flood control project for the river. Two locations, however, were proposed as likely sites for future power dams in the upper Savannah River Basin: Clark Hill and Hartwell.[1]

## THE CLARK HILL PROJECT

The multipurpose dam and reservoir project for the Clark Hill site was not authorized until 1944, but interest had been kept alive through the efforts of Augusta community leaders such as Lester Moody, Chairman of the Chamber of Commerce; Dick Allen, Mayor of Augusta; Tom Hamilton, Editor of the *Augusta Chronicle;* and other members of the Savannah River Improvement Commission. In May 1935 Colonel Creswell Garlington, District Engineer, invited these men to Savannah to discuss the Savannah River development. Garlington told the group that they should press their case by tying navigation improvements, flood control, and power together and focusing on the Clark Hill site as the location for a dam that would accomplish these objectives.[2]

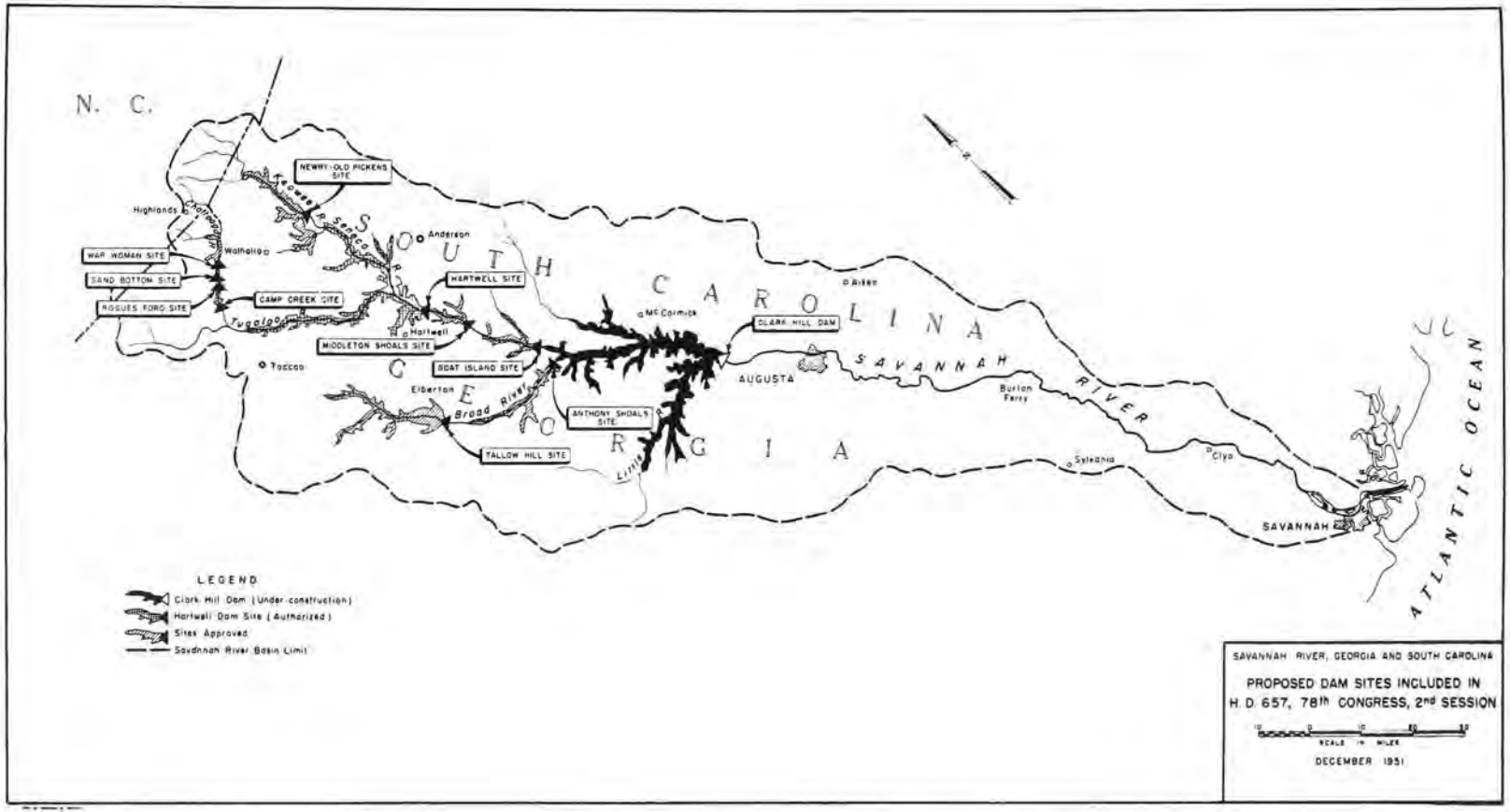
The Augusta delegation, impressed with the District Engineer's suggestion, went to Norfolk to enlist the aid of Division Engineer, Earl I. Brown. On Brown's recommendation, the group then met twice with General Edwin M. Markham, Chief of Engineers. After securing the support of Georgia Senators Walter F. George and Richard Russell and of Congressman Paul Brown of the 9th Congressional District, they approached the President himself. On 8 August 1935, after several months of document preparation and project analysis, Presi-



*Seismic explorations being conducted at the site of the Clark Hill Dam prior to the authorization of the project. September 1940. (Savannah District, Corps of Engineers)*

dent Roosevelt appointed a special board to investigate the possibility of constructing the Clark Hill and other proposed dams north of Augusta. In October a public hearing was held in Augusta. The findings from this meeting were forwarded to the President in February 1937. As a result of all of this action and interest, the Committee on Commerce of the U.S. Senate passed a resolution on 1 November 1938 that called on the Board of Engineers for Rivers and Harbors to review the 308 Report on the Savannah River "with a view to determining the advisability of constructing a reservoir on the Savannah River at the site known as Clark Hill for the development of hydroelectric power" as well as for aiding navigation of the river below Augusta and "for other beneficial effects."[3] The review, conducted by the Savannah District office, was submitted through the Board of Engineers for Rivers and Harbors and the Secretary of War to the Committee on Commerce on 22 April 1939. Although World War II diverted the nation's attention from this and other civil works projects, the Augusta group retained their vision for the development of the Savannah River Basin.[4]

The next comprehensive study of the upper basin was completed in 1943. The report that resulted from this survey was included in House Document 657, 78th Congress, 2d session, and was based on authorization that predated the war.[5] Colonel Peter A. Feringa, the District Engineer who was responsible for the study, reported that the Savannah River Basin offered an exceptional opportunity for developing multipurpose projects and that the best plan for developing the water resources of the basin would start with the construction of the Clark Hill development, to include a full power pool of 335 feet above mean sea level. The District Engineer went on to recommend that the Clark Hill project should



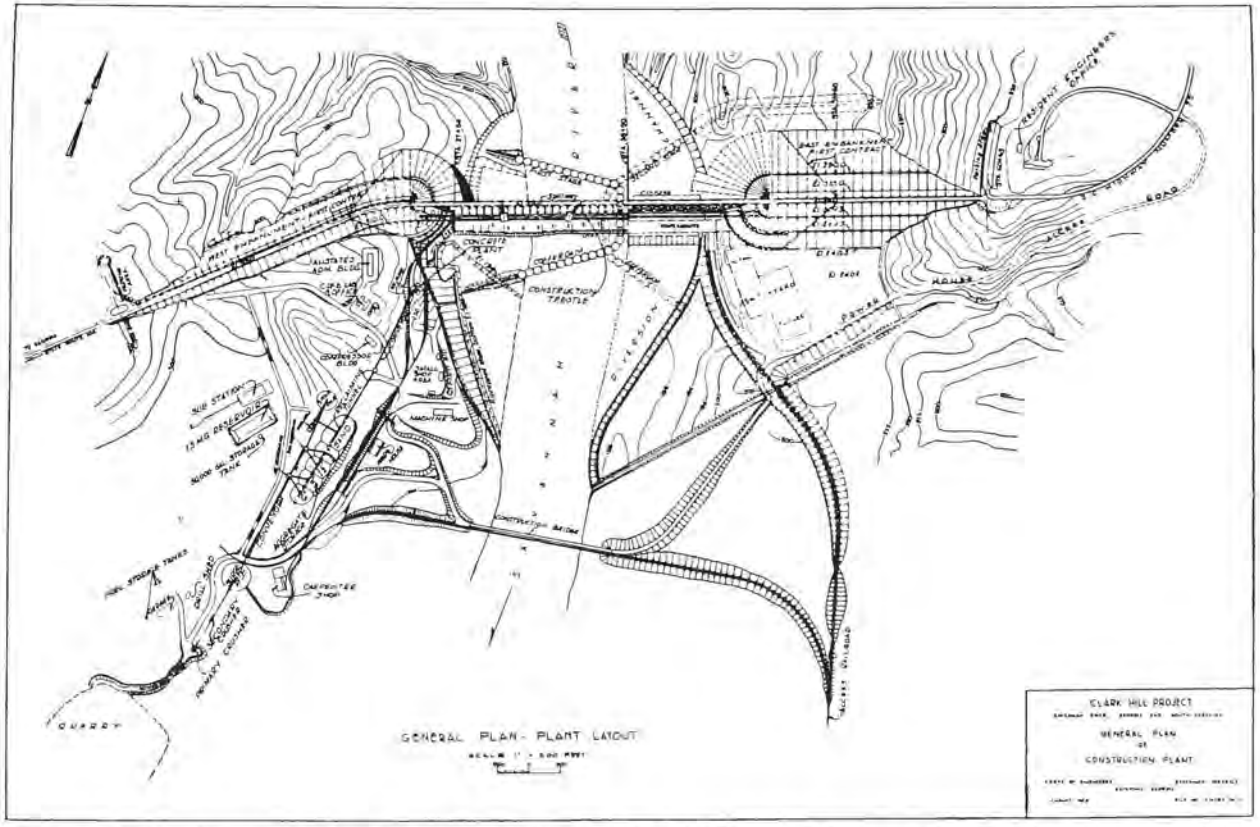

*Map of proposed dam sites for the development of the Savannah River above Augusta. December 1951. (H. Doc. No. 657, 78th Cong., 2d Sess.)*

be followed, in order, by the Hartwell, the Goat Island, and the Middleton Shoals Dams on the Savannah River; the Camp Creek, the Rogues Ford, the Sand Bottom, and the War Woman Dams on the Chattooga River; the Tallow Hill and Anthony Shoals Dams on the Broad River; and possibly, in the distant future, dams at the Newry-Old Pickens site on the upper Seneca River.[6] The report added that other advantages such as reduction of dredging costs in Savannah Harbor; reduction of saltwater intrusion into the lower reaches of the river; and benefits to recreation, wildlife, and general industrial development could be expected from constructing this system of dams. Flood control, navigation improvement, and power development remained, however, the primary justifications for the projects. This general plan for developing the upper Savannah River Basin was approved, and construction of the Clark Hill Dam was authorized in Public Law 534, 78th Congress, passed on 22 December 1944.

The Clark Hill Reservoir, the first of the multipurpose projects to be completed in the comprehensive river basin development plan, is approximately 22 miles above Augusta. The project report, completed in May 1946, called for the dam to have a total length of 5,682 feet, including a concrete section 2,282 feet long flanked on either end by earthen embankments. The height of the concrete dam was planned for 200 feet. A 1,096-foot spillway was to span the main river channel. The spillway would be topped by 23 tainter gates, each 40 feet long by 35 feet high, which could be opened to release water from the reservoir pool. The plan called for a reservoir with a maximum elevation of 335 feet above mean sea level. The top five feet of this maximum pool would be used for flood control, and the pool between elevation 305 and 330 was planned for power generation. When completed, this would be one of the largest inland bodies of water in the South.[7] The reservoir impounded by the dam would extend 39.4 miles up the Savannah River and would have a surface area of 78,500 acres. The shoreline would be approximately 1,200 miles long.[8]

Construction at the Clark Hill site began on 1 August 1946 with the letting of a contract for the access railroad. That same year, a contract was let for diverting the river from its normal channel, and in 1947 construction of the first-stage cofferdam in the original channel began. Both east and west earth embankments were partially constructed and a temporary bridge to carry vehicular and rail traffic was erected across the river downstream from the dam site. During 1946 and 1947, sub-surface seismic exploration of foundation conditions and of the quarry site was also in progress. An excellent quality of granite was found within one mile of the dam, and a later decision to manufacture fine aggregate and sand from the same granite material allowed for close control of the quality of the concrete used in the dam construction.[9]

The contract for the dam was awarded in November 1947. The construction plant for this work, costing $2.5 million, was completed by October 1948. The plant consisted of quarrying facilities, primary and secondary crushers, a system of conveyors for transporting the aggregate in its various gradations, and a concrete mixing plant capable of producing 200 cubic yards of concrete per hour. Three revolving gantry cranes with 125-foot booms capable of placing a four-yard concrete bucket anywhere within the area of construction were mounted on a steel trestle erected parallel to the axis of the dam.[10]




*Drawing showing the general plan of construction for the Clark Hill Dam on the Savannah River above Augusta. Notice the layout of the cofferdams and the diversion channel designed to allow for the construction of the dam in two stages. August 1949. (Savannah District, Corps of Engineers)*



*Clark Hill construction. This view of the construction site at the Clark Hill Dam shows the embankment on the Georgia side of the river (foreground), the reservoir (center), the quarry (far right), the aggregate storage piles (left center), and the construction buildings. 1948. (Savannah District, Corps of Engineers)*

The composition of the concrete to be used in the dam was researched extensively to find the right "recipe" for providing maximum strength. This was necessary because the dam was designed as a gravity-type structure in which the weight of the dam is always greater than the weight of the water pushing against it. To prevent the concrete in the dam from cracking from pressure and weather conditions, the "setting" process had to be controlled rigidly. In order to reduce the heat of hydration within the mixture during the curing stage, ice was used in the concrete mix. The ice was provided by two compressors capable of producing 150 tons of ice daily. In another effort to achieve maximum strength, 20 percent natural cement was mixed with typical portland cement, sand and gravel from local granite material, and air entraining agents. William T. Neelands, the Engineer technician in charge of this phase of construction, was considered an expert in masonry construction.[11]

After completion of the cofferdam on the Georgia side of the river, the rock bed of the channel was excavated and prepared, and the first concrete was placed in October 1948. By the following May, initial construction of the spillway section had been completed. The second-stage cofferdam then was constructed, restoring the river to its original channel where it flowed through the eight sluiceways provided in the spillway section. Construction operations moved to the South Carolina side of the river.[12]



*A view of the Clark Hill site after construction operations had been moved to the South Carolina side. Notice the cofferdam on the far (east) side of the river, the river flowing through the spillways in the main dam, and the water reservoir and aggregate piles on the near bank. The cofferdam on the South Carolina side of the river holds back the water while the powerhouse is under construction. 1950. (Savannah District, Corps of Engineers)*

When work was to begin behind the second-stage cofferdam, the Engineers discovered a fault in the rock bed of the river. After thorough investigation, it was determined that satisfactory foundation conditions could be obtained by inserting concrete into the fault under pressure. Concrete operations on the main dam, however, were not resumed until January 1950, in part because of the nationwide steel strike in the fall of 1949. By November 1950, the intake section of the dam, which would service the powerhouse, was near completion. The spillway crest was completed by July 1951, and work had been started on raising the concrete piers for the tainter gate installations.[13]

Meanwhile, contracts for the main generating units were placed in the summer of 1949, and a contract for the construction of the powerhouse was awarded in October 1950. Each of the generators required 32 railroad cars to transport it to the site.[14] The downstream arm of the second-stage cofferdam had been left in place to facilitate construction of the powerhouse. Because of a shortage of materials due to the military requirements of the Korean conflict, this phase of the project lagged from its beginning. However, by July 1952 the powerhouse was 60 percent completed.[15] The first generating unit was operating by November 1952, and the first electrical power from the dam was transmitted



*Clark Hill Dam after construction was completed. This view shows the completed dam, the earthen embankments on either side of the concrete dam, the powerhouse, the switchyard, and the impounded lake. 1965. (Savannah District, Corps of Engineers)*

into South Carolina in January 1953.[16] Six remaining units went into operation between February 1953 and July 1954.[17] At that time the project was considered to be complete at a cost of almost $78.5 million.[18] The estimated cost of the entire project at its inception in 1944 had been $35.3 million.

The work on the Clark Hill project, however, was not without problems. Perhaps the most serious of these was the dispute between the Corps of Engineers and private power corporations in the fall of 1946. The events leading to the conflict began as early as 7 August 1928, when the Federal Power Commission issued Permit No. 798 to the Savannah River Electric Company, a subsidiary of the Georgia Power Company, for the construction, operation, and maintenance of a hydroelectric project at the Clark Hill Dam site. In 1932, because of the depressed economy and a consequent lack of demand for electric power, the company surrendered its license. As already noted, in 1935 a group of representatives from Augusta and the Augusta Chamber of Commerce began negotiations with the Corps of Engineers for the development of the Savannah River Basin. Before pursuing their objectives in Washington, D.C., however, this group met with the President of the Savannah River Electric Company, P.S. Arkwright. He assured the group that his company had no desire to revive plans for a hydroelectric plant at the Clark Hill site. Mr. Arkwright "pledged his cooperation and stated that his company would be interested in purchasing the power at the switchboard if and when the project was completed."[19] Moreover, he expressed willingness to cooperate again on 2 October 1935 at a hearing in Augusta before the special board that had been appointed by President

Roosevelt to investigate the Savannah River Basin project. The Corps of Engineers then began to develop the project as discussed earlier.

In August 1946 the preliminary work on the Clark Hill project was halted by President Truman's freeze order in response to the depressed economic conditions following World War II. Taking advantage of this situation, the Savannah River Electric Company applied for a renewal of its license to build the plant.[20] This action introduced the issue of whether the Government or private corporations could best provide electric power for public consumption. During October and November 1946, the Federal Power Commission held public hearings in Atlanta relating to the power company's application. Perhaps not coincidentally, President Truman lifted his freeze order on the Clark Hill construction funds, and work was resumed in late November under the direction of the Corps of Engineers.[21] In January 1947 the Federal Power Commission ruled against renewing the power company's license, and the way seemed clear for the Government's construction of the dam.

Undaunted, however, the Georgia Power Company secured the support of Representative George A. Dondero of Michigan, chairman of the House Committee on Public Works. Congressman Dondero introduced a bill that would have authorized and directed the Federal Power Commission "to grant a license to the Savannah River Electric Company to construct, own, operate, and maintain the powerhouse of the Clark Hill Reservoir Project."[22] This would have allied the power company with the Corps of Engineers. The Engineers would build the dam and reservoir, and the power company would be responsible for the powerhouse. The bill subsequently was defeated, but the debate continued for almost two years. In January 1949 the Georgia Power Company finally announced that it would no longer fight for control of the power produced by the Clark Hill and other river basin projects.[23]

The Corps of Engineers also encountered some difficulty in acquiring the necessary land for the reservoir basin as power companies challenged the Government's condemnation procedures. In December 1946 the Savannah River Electric Company lost a court case when a Federal judge ordered that 1,532 acres of company land be turned over to the Government for Federal development of the project.[24] In March 1947 this court order was challenged in U.S. District Court in Atlanta. The company claimed that the December order was unconstitutional because the action had been taken before any condemnation papers had been served. Company officials also argued that the land in question was part of a much larger tract that had a value for hydroelectric development of more than $2 million, and that Federal possession of the land at the dam site would destroy the value of the entire tract.[25] Eventually, this conflict was settled in favor of the Corps of Engineers, and the entire 164,000-acre area was acquired.

Another controversy arose over the Corps policy related to basin clearing. The original plan was that all vegetation below the full 330-foot power pool would be cut, stacked, and burned. After the first contracts went out for bids, however, the Engineers developed a policy of "selective clearing." This modified policy, adopted to save time and money, was applied to similar projects nationwide.[26] Residents of the Savannah River Basin area, however, cited the possibility of an outbreak of malaria and expressed concern about the deterioration of

the recreational value of the lake. As a result of this local opposition to the new policy, the clearing procedure was changed again to provide for total clearing of timber in the fluctuating water zone and topping of trees several feet below water level in the minimum water pool.[27] Archaeological explorations and the relocation of people, cemeteries, and roads were other problems that had to be solved before water could be impounded in the basin behind the completed dam. These were dealt with simultaneously with the construction of the dam.

In addition to providing power benefits, the Clark Hill project was designed to reduce floods on the Savannah River and to increase depths for navigation in the river below Augusta. The regulated flow from Clark Hill Lake substantially benefits the authorized 9-foot navigation channel on the river below Augusta by reducing the cost of both construction and maintenance and by reducing the sediment carried into Savannah Harbor by as much as 22 percent.[28] The Clark Hill project also is estimated to prevent flood damages in unleveed areas at and below Augusta of approximately $185,000 annually. For instance, it reduced the height of the March 1964 flood from 38 feet to 25 feet at Augusta, where the flood stage is 32 feet.[29]

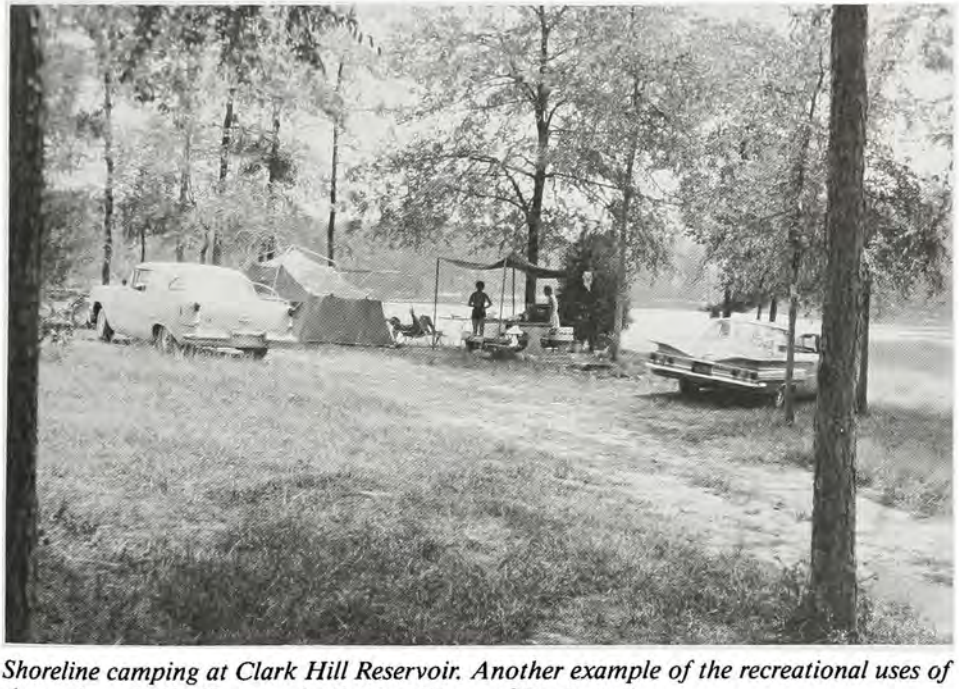
The 1944 legislation authorizing the construction of the Clark Hill project also provided that the Corps of Engineers was empowered "to construct, maintain, and operate public park and recreational facilities in reservoir areas under the control of the War Department."[30] For the first time the Corps was in the business of providing recreation facilities, and the Clark Hill development involved this new function. In November 1948 public meetings were held in Lincolnton, Georgia, and in McCormick, South Carolina, to acquire commu-



*Sailboats on the waters of Clark Hill Reservoir. 1954. (Savannah District, Corps of Engineers)*



*Public swimming area at Elijah Clark State Park on the Georgia side of the Clark Hill Reservoir. 1954. (Savannah District, Corps of Engineers)*



*Shoreline camping at Clark Hill Reservoir. Another example of the recreational uses of the project. 1963. (Savannah District, Corps of Engineers)*

nity input into developing a recreational plan for the basin.[31] At these meetings, Colonel Paschal Strong, Savannah District Engineer, announced that Corps policy was to work closely with local interests. He further stated that it was incumbent on state or local governmental agencies to develop and manage the public parks, subject to the approval of the Corps of Engineers; that participation by local, state, and other governmental agencies would determine the number of facilities provided; and that any plans were subject to final approval by the Chief of Engineers. Under these conditions and with considerable local involvement, an initial plan for recreation and conservation was developed for Clark Hill. More recently, The Water Resources Development Act of 1986, Section 864, added recreation and fish and wildlife management as project purposes for Clarks Hill.[32]

The first Clark Hill recreation facilities were constructed between 1946 and 1954, coincidental with completion of the dam. The lake, one of the largest inland bodies of water in the South, has been a popular site for fishing, boating, camping, picnicking, and other forms of recreation. Because of the lake's popularity and the public-use legislation passed during the 1960s and 1970s, the Savannah District consistently has tried to provide numerous facilities for use by the general public. By 1989 many of these facilities were nearly 35 years old and in need of major repair or rehabilitation.[33] A program was underway to close and consolidate many of the small, isolated recreation areas to better use existing funds and manpower. Several over-used, rundown recreation areas were revamped to provide some of the finest day-use facilities found in any Corps of Engineers civil works projects, and by 1989, 37 of the 53 recreation areas on the lake were operated by the Corps. Public response to these improved camping sites, picnic sites, shelters, and restroom facilities was very favorable.[33] Sanitary facilities in nine areas, water and electrical hookups in eight campgrounds, and additional support facilities such as playgrounds and sanitary fish-cleaning stations also were planned.[34]

Through leasing and licensing, the Corps also provided reservoir lands for recreational development by club groups, private organizations, and governmental bodies at city, county, and state levels. This program is administered by the Corps Natural Resources Manager and is governed by the Lakeshore Management Plan. As of 1989, the Resource Manager controlled approximately 1,500 permits/licenses.[35]

The Lakeshore Management Plan for Clark Hill Lake was approved in April 1983 and superseded the interim plan, which had been used since June 1976. The final plan provided a framework for fulfilling both present and future demands as well as for assuring maximum benefits to the public. The permit/licensure program administered under this plan allowed adjacent property owners to install and use boat docks, walkways, utility lines, and other minor private facilities.

Two problems emerged in connection with the management program at Clark Hill. The first related to serious erosion on the South Carolina shoreline as a result of wave action against the shore caused by sustained strong westerly winds. Some land had eroded as much as three feet per year, affecting both public and private property.[36] Homeowners, private marinas, and local businesses asked the Corps of Engineers for assistance in constructing breakwaters



*An example of rip-rapping placed along the shoreline at Clark Hill Lake to prevent shore erosion. 8 March 1968. (Savannah District, Corps of Engineers)*

to halt the erosion. The primary solution, constructing riprap along the shoreline, cost approximately $100 per linear foot of shoreline. The District had no authority to spend federal monies to protect private property, however, and in most cases it was more economical to purchase the property than to try to stop the erosion. Property owners generally have opposed this solution.

The other problem concerned the passage of Public Law 97-140 in 1982. This law hampered efforts to manage the lakeshore for the maximum benefit of the public because many previously authorized private facilities that were scheduled for phaseout or removal from the public lands were permitted to remain until 1 January 1990. These facilities included mobile homes, private roads, docks, and ramps. Public Law 97-140 also made it difficult to explain to adjacent property owners why they were denied new permits for these facilities while their neighbors may maintain them.

In 1980, in addition to private club and quasi-public facilities, the Clark Hill project had 70 developed public-use areas.[37] Georgia and South Carolina leased reservoir lands for intensive wildlife management. These areas provided turkey, deer, quail, dove, duck, and other small-game hunting in season. The Corps of Engineers also improved the habitat for deer and turkey on reservoir lands, and provided protected fields for doves and ponds for ducks. The maintenance of approximately 125 permanent wildlife food plot areas for quail and doves was one of the most beneficial and time-consuming activities at Clark Hill. The District also completed a 20-acre manmade impoundment near the headwaters



*(a)*



*(b)*

*Wildlife management at Clark Hill: (a) a field planted as a foodplot for dove and quail and (b) one of the many bluebird nesting boxes placed along the lakeshore. (Savannah District, Corps of Engineers)*



*These "tire unit" fish attractors are being prepared for sinking in Clark Hill Reservoir. (Savannah District, Corps of Engineers)*

of Fishing Creek, Georgia, which can be drained and planted in the summer and then flooded in winter to provide an abundant food supply for ducks visiting the area. Bluebirds also benefit from nesting boxes erected on selected sites in the public recreation area.[38]

A wild turkey restoration project has been established at Bussey Point wilderness area on the lake. It is a cooperative endeavor of the U.S. Army Corps of Engineers, the Georgia Department of Natural Resources, the National Wild Turkey Federation, the Georgia Wild Turkey Federation, and 7 private landowners. This 2,500-acre peninsula in Lincoln County, provided by the Corps, is managed to provide wildlife habitat under a "National Forest" management concept. The Georgia Department of Natural Resources, Game Managemant Division, and the Corps are responsible for general managemant of the project with the State agency responsible for the trapping of excess birds.[39]

The Bussey Point area came under some controversy in 1986 when the Chairman of the Lincoln County (Georgia) Commission suggested that "the Corps has control of too much property and if there is any they don't need, they should turn it loose." He insisted that "it would be better for the citizens of Lincoln County if it [the land] was put on the tax digest."[40] This suggestion was instigated by the sale earlier in the year of more that 3,000 acres of Corps land in the State of South Carolina which had been declared surplus and was planned for commercial development. The South Carolina transaction was the culmination of 15 years of negotiations between the Corps and a State-created

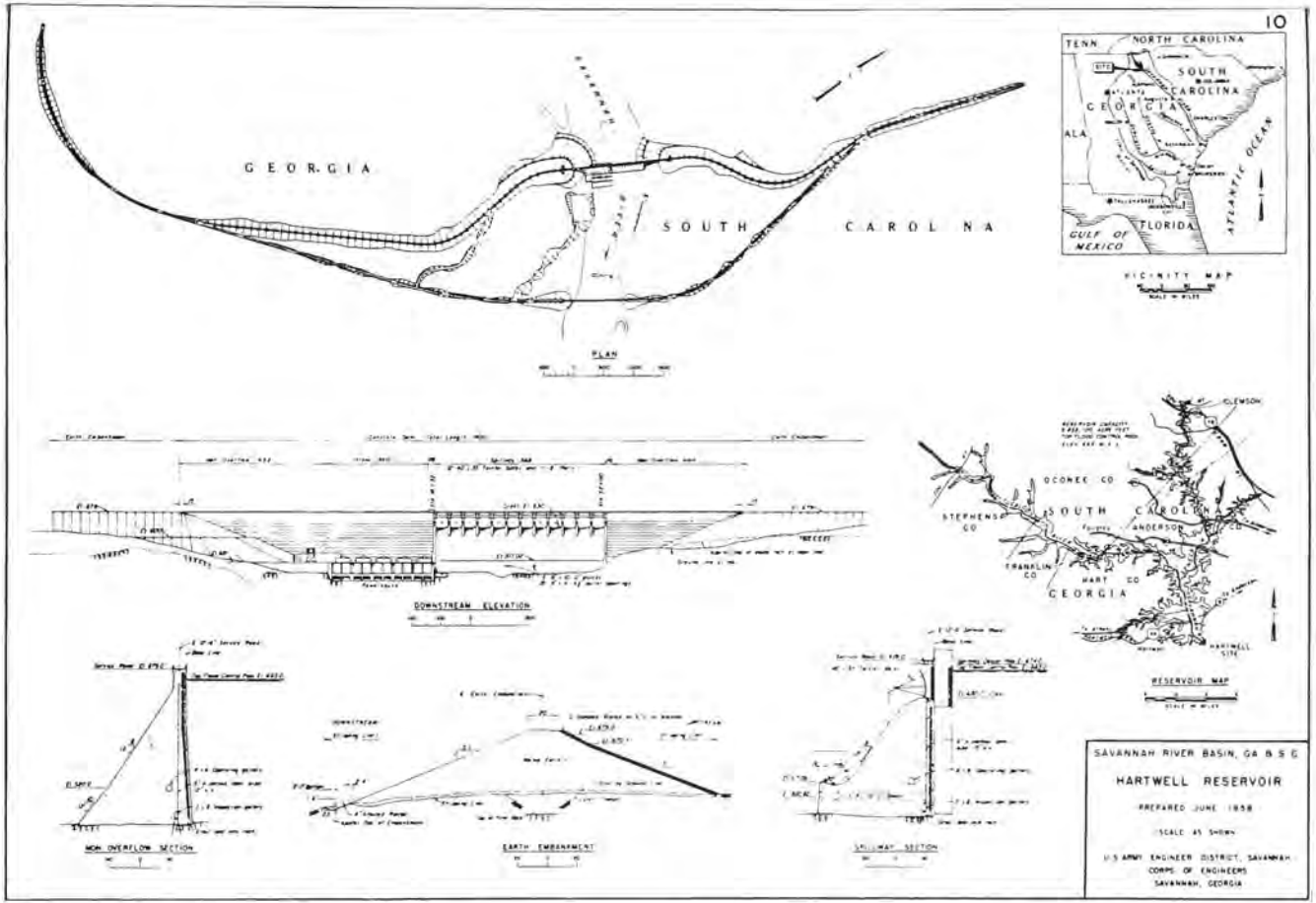
culmination of 15 years of negotiations between the Corps and a State-created agency concerned with lakeshore development. The long period of negotiations was necessitated by the reluctance of the Corps to set just such a precedent, and while the Bussey Point controversy was short-circuited, the precedent remained.[41]

In order to enhance fisheries at the reservoir, the Corps of Engineers worked with state agencies to minimize annual water-level fluctuation in the spring to aid in the reproduction of bass and crappies. Also, within the reservoir proper, several "tire unit" fish attractors were sunk, each consisting of 50 bundles of nine tires arranged in a pyramid shape. The lower tires were filled with concrete to assure that the attractor was anchored firmly to the bottom of the lake. All attractors were attached to buoys marking their location. These programs, which were designed to enhance fish and wildlife populations and to provide the public with access to them, made Clark Hill one of the most popular of the reservoirs maintained by the Corps of Engineers. In 1988 more than 6 million people visited Clark Hill, and the lake continued to rank among the top 10 most popular Corps of Engineers projects in the nation.[42] In December 1987 the Congress of the United States by Joint Resolution designated Clarks Hill Dam, Reservoir, and Highway atop the Dam as the J. Strom Thurmond Dam, Reservoir, and Highway. Thereafter, all references to the project carried the new designation. The name change, which was quickly passed in response to a resolution introduced by Rep. Butler Derrick (D-S.C.), created several months of controversy in local news media.[43]

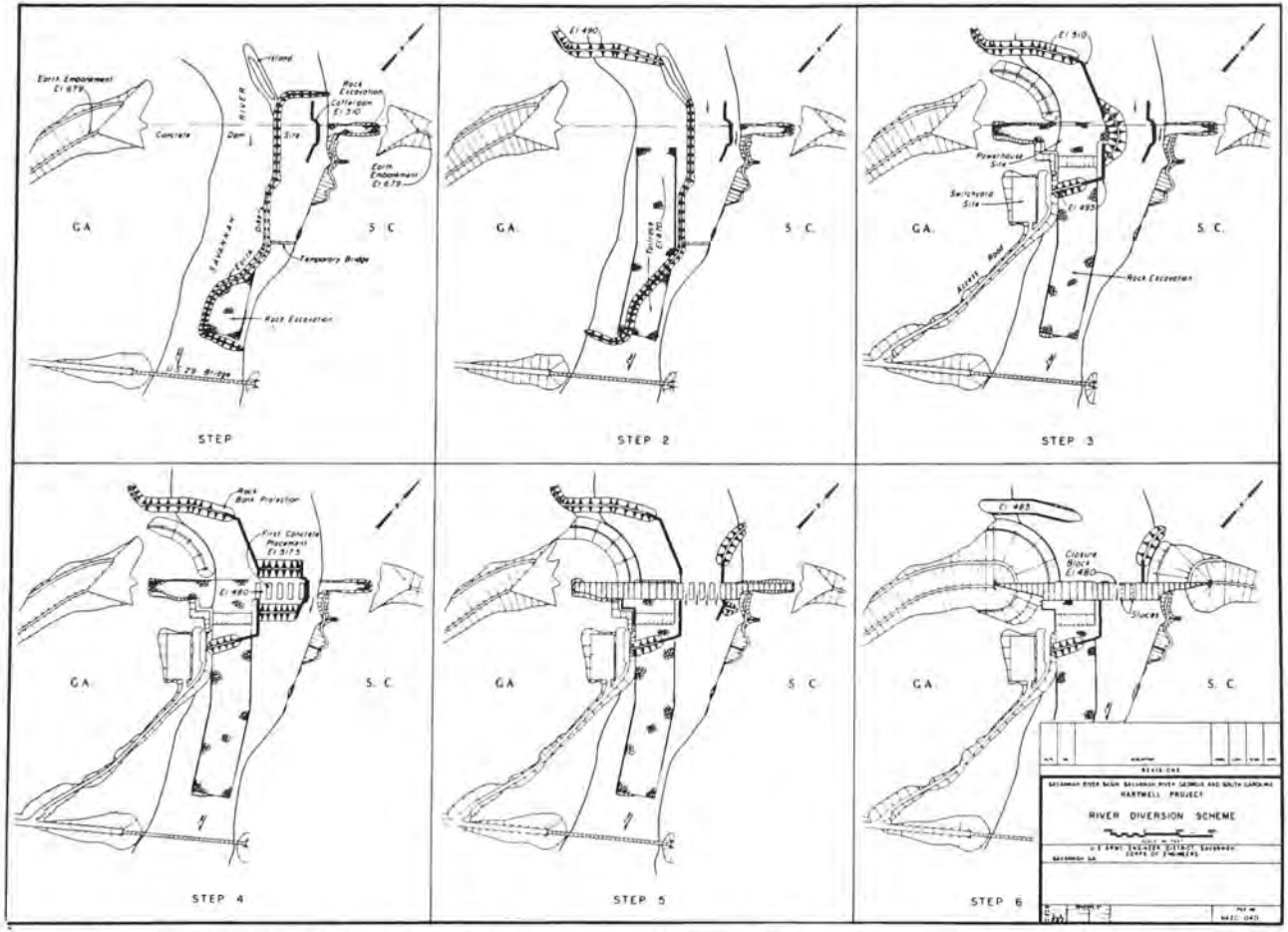
## THE HARTWELL PROJECT

The Flood Control Act of 17 May 1950 authorized the Hartwell Dam and Reservoir as the second unit in the comprehensive development of the Savannah River Basin.[44] The estimated cost was $68.4 million based on 1948 price levels and preliminary designs. The original project provided for a gravity-type concrete dam 2,415 feet long with earth embankments at either end, which would be 6,050 feet long on the Georgia side and 3,935 feet long on the South Carolina side. The 12,400-foot-long dam was to be topped with a roadway 24 feet wide. The main dam was to consist of two nonoverflow concrete sections on the right and left banks 887 feet and 940 feet long, respectively; a gravity-type concrete spillway 588 feet long equipped with 12 tainter gates 26 feet by 40 feet in the channel; and a powerhouse on the South Carolina side of the river.[45] Full power pool was designed to be 660 feet above mean sea level. At this elevation, the reservoir would extend 7.1 miles up the Savannah River to the confluence of the Tugaloo and Seneca Rivers; 41 miles up the Tugaloo to within approximately 2 miles of the existing Yonah Dam; 27 miles up the Seneca to the mouth of the Little River, South Carolina; 2 miles up the Little River to the Newry site; and 7 miles up the Keowee to the Old Pickens site. The reservoir would cover 56,500 acres and would involve the relocation of 3 sections of railroad totaling 2 miles, the raising of 2 railroad bridges, construction of 6 sections of new state highways totaling 19.6 miles and 9 sections of county roads totaling 12.7 miles, the construction of 9 new bridges and the raising of 4 existing bridges, and the relocation of 2 power transmission lines.[46]

As construction of the dam got under way, the specifications changed from




*Drawings of project plans for the Hartwell Dam and Reservoir. June 1958. (Savannah District, Corps of Engineers)*




*Series of drawings showing the stages of construction in the Hartwell Project. (Savannah District, Corps of Engineers)*

time to time. The length of the concrete portions of the structure was reduced to 1,900 feet, the roadway was removed from atop the dam and made to cross the river just below the dam site, the size of the tainter gates was increased from 26 feet by 40 feet to 35 feet by 40 feet, and the powerhouse was relocated from the South Carolina to the Georgia side of the river. Periodically, construction costs were revised upward to a final figure of almost $90 million. The first appropriations for construction were made on 15 July 1955, and the first major contract was awarded 14 October 1955 for construction of the earth embankments.[47] Filling of the reservoir began in February 1961 and was completed in 1962.

When the dam was constructed, 5 penstocks were provided for the installation of four 66,000-kilowatt generating units and a future 80,000-kilowatt unit. The fifth unit was completed in 1985, bringing the total generating capacity to 344,000 kilowatts. The Hartwell project has provided not only electricity for municipalities and electric cooperatives but also an ample water supply for industry and domestic use. Power is sold through the Southeastern Power Administration (SEPA) to private power companies and public cooperatives. From 1962, when power was put on line, through September 1988 SEPA paid the Corps $118,485,133 for power. The total cost of the Hartwell Project was $89,240,000.[48]

In addition to power production, 5 feet of storage above the maximum power pool have been reserved for flood control. This feature at Hartwell, along with that at Clark Hill, reduced flood damage in the areas downstream by an estimated $363,000 annually. Hartwell alone prevented an estimated $9.47 million in flood damages through the regulation of flood flows from 1962 through FY 1987. The combined control by the Hartwell and Clark Hill multipurpose projects permitted the use of some of the earlier undeveloped lowlands below Augusta for agriculture and also allowed extensive development in the low areas of Augusta. Flow regulation at Hartwell also increased the dependable production of power at Clark Hill and benefited navigation by increasing the minimum streamflow below Augusta. Water released through the turbines as power is generated at Hartwell and provides adequate regulation of flow in the river below the dam to benefit fish and wildlife, to aid navigation below Augusta, and to increase the dependable power at Clark Hill.[49]

The large lake created by the impounded waters at Hartwell has been used extensively for recreation. The number of visitors to the project has increased regularly from about 750,000 in 1962 to over 13 million during 1988. This ranked Hartwell second of the ten most popular Corps projects in the nation. The Corps has developed 61 public-use areas in addition to recreational facilities provided by private club and quasi-public groups.

The Hartwell Lakeshore Management Plan was initially approved in 1979 after more than 4 years of work by Corps personnel, 4 public meetings, and a congressional hearing. This plan for the orderly development of the lake's shoreline serves to protect and manage the shoreline, establish and maintain acceptable fish and wildlife habitats, and help meet the recreational needs of the general public. The Management Plan became the subject of controversy because adjacent lakeshore landowners were being required to improve their property to meet the standards established by the Corps of Engineers. The plan sought to achieve a balance between the needs of these landowners while at the



*Construction getting underway at the Hartwell site as seen looking north, August 1958. (Savannah District, Corps of Engineers)*



*This view from the South Carolina side of the Savannah River shows construction on the Hartwell Dam almost completed. Notice the cofferdam still in place to keep water away from the powerhouse construction area. The reservoir is being impounded behind the dam and is flowing through the sluice gates. 1961. (Savannah District, Corps of Engineers)*



*Aerial view of the Hartwell Dam showing the new highway bridge that had to be constructed across the Savannah River below the dam. Note the twelve taintor gates in the main spillway section, the powerhouse to the left of the spillway, the switchyard to the extreme left, and the impounded reservoir behind the dam. (Savannah District, Corps of Engineers)*

same time promoting a safe, healthful use of the lakeshore for recreational purposes.[50] The Hartwell Plan which was revised and updated in 1989 after another series of public meetings and workshops held in September 1988, provided a set of maps of the entire lake, pinpointing areas where private mooring facilities were permitted as well as areas where docks were in a "grandfather" status. It also gave basic information on requirements for the construction of mooring facilities and those permits or licenses required by landowners for any facilities placed on government property.[51] Information on required activities such as mowing and underbrushing was also provided in the Plan.[51]

In attempts to involve local communities and the public in special activities at the lake, several events have been held each year at Hartwell. The Hartwell Dam Run, which includes a course across the top of the dam, has drawn wide participation every spring.[52] Approximately 1,000 runners competed in the 1988 event.[52] Children up to 14 years old have participated in the Fishing Rodeo for Kids. In August 1983 the Hartwell Clean Lake Campaign brought out 1,500 people who collected 794 pounds of aluminum for recycling, along with 2,500 bags of litter, a refrigerator, a television set, and bedsprings.[53] Because of this annual campaign, which began in 1982, Hartwell was cited in July 1988 as one of 109 national winners in the "Take Pride in America" program. President



*Campers enjoying the water of the reservoir at one of the many public use areas on Hartwell Lake. 1969. (Savannah District, Corps of Engineers)*



*An aerial view of Portman Shoals Marina at Hartwell Lake, 1967. The Hartwell Lakeshore Management Plan was prepared to regulate this type of lakeshore development. (Savannah District, Corps of Engineers)*

George Bush attended and participated in the Hartwell award ceremony.[54] Over 4,000 people took part in the 1988 cleanup campaign. Hartwell Lake was also selected as the U.S. Army Corps of Engineers Project of the Year for 1983 because of its outstanding management program, public involvement activities, educational and public awareness programs, and preservation and environmental protection programs.

In 1979 an intensive program was initiated to upgrade the facilities in the campground and day-use areas of Hartwell Lake. Primarily, the work involved rehabilitating individual sites, installing electrical and water hookups at campsites, installing playground equipment, improving storage facilities, installing erosion control devices, improving swimming and beach areas, and developing facilities for the handicapped. As of 1989, work had been completed on 300 campsites and 250 picnic sites in 13 different campgrounds or recreation areas.[55]

Fiscal year 1988 funding enabled the management staff at Hartwell to proceed with improvement work in selected recreational areas. This work involved installing picnic shelters and playground sets, installing shoreline protection devices for erosion control, rehabilitating picnic and camping sites, expanding parking facilities, and constructing additional beach areas.

During construction, the Hartwell project was seriously challenged on only two occasions. The first instance was in August 1956 when Mrs. Eliza Brock and her daughter refused to allow workmen to come onto their property to begin clearing for the reservoir area. The controversy involved 103 acres of land that reverted to government ownership on 21 June 1956 when a formal "declaration of taking" was filed by the Corps of Engineers. Apparently, Mrs. Brock never received an offer for her land and therefore refused to allow government workers on the property. She and her daughter used a rifle to hold off contractors until a court order was served on 27 September. After delaying timber-cutting procedures for more than a month, the 78-year-old Mrs. Brock settled the issue out of court and accepted the Government's offer of $6,850 for her property.[56]

The second challenge to the Hartwell project came in late 1956 when Clemson College objected to the damage that would be done to its property as a result of the impounded water in the reservoir. Correspondence between the Corps of Engineers and Clemson relating to the construction of the Hartwell project and its effect on the college began as early as 1949. In addition, representatives of the college and the Corps held numerous meetings prior to 1956. At a 16 December 1952 meeting in the office of Dr. Robert F. Poole, president of the college, a proposed plan for the Clemson College area was presented to college officials. In a letter of 5 July 1955, the Corps furnished the vice chairman of the Board of Trustees of the school with information on plans for acquisition, relocation, and protection of facilities in the Clemson area. This information was substantially the same as presented to the college officials in December 1952.[57] The Board of Trustees then pledged their cooperation in the Hartwell project.[58] By 1956 Dr. Robert E. Edwards had assumed the presidency of Clemson College, and on 29 June 1956 the chairman of the Hartwell Dam Subcommittee of the Board of Trustees transmitted to the Savannah District a report compiled by a private engineering firm on the Hartwell project as related to Clemson College. Based on this report, three plans were proposed by the

board for the protection of school holdings. In order of preference, these plans proposed the following: lowering the power pool from 660 feet to 610 feet; diverting the Seneca River around the endangered college property to prevent the anticipated flooding; or compensation for college lands and facilities that would be affected by the impounded waters. The Corps proceeded in anticipation of reaching agreement on the basis of the third plan until December 1956, when the Clemson trustees declared the land irreplaceable and the damage that would be done to the college irreparable.[59]

Following the claims made by Clemson of irreparable damage resulting from construction of the Hartwell project, and the support which these claims received from the U.S. Department of Agriculture, construction on the project was halted pending further investigation. The Chief of Engineers attended a meeting at Clemson College on 20 December 1956 and subsequently requested authority from the Public Works committees of both the Senate and the House to restudy the project. Following the authorization, the Corps did a restudy during the early months of 1957. One curious circumstance that surfaced during the restudy was the fact that the Department of Agriculture had conveyed more than 7,600 acres of bottom land along the Seneca River to the college for the payment of one dollar in December 1954, more than four years after the authorization of the Hartwell project. This had been done without the knowledge of the Department of Army. In December 1956 the Department of Agriculture declared that the damage to this land "would be so great as to cast serious doubt on the economic feasibility of the project."[60] Following the restudy it was concluded that redesigning the project with a power pool of 610 feet would be economically unfeasible and that the only alternative was to provide for the diversion of the Seneca River so that impounded waters would pose no threat to the Clemson College lands. On the basis of this revised project, work was resumed in 1957 and completed in December 1963.

The two diversion dams built in the vicinity of Clemson College in 1961 to rechannel the Seneca River and protect valuable school facilities were constructed of random earth fill raised on alluvial soil. Seepage on the dry or protected side of the structures required numerous repairs over the years, so in 1982 steps were taken to solve the problems permanently. The solution involved constructing concrete cutoff walls within the existing earthen dams using a slurry wall panel method. This technique, borrowed from an earlier construction method used at the West Point project, involved excavating a trench along the entire length of each of the earthen dams and filling the trenches with a soupy masonry mixture that, when hardened, formed a relatively impervious concrete wall. Work on the lower diversion dam at Clemson was completed in December 1982, and seepage was reduced to the level anticipated. Work on the upper dam began in June 1983 and was completed in June 1984, well ahead of schedule.[61]

## THE RICHARD B. RUSSELL (TROTTERS SHOALS) PROJECT

A resolution adopted by the Senate Committee on Public Works on 16 July 1958 instructed the Board of Engineers for Rivers and Harbors to review the report on the Savannah River Basin development as presented in House Document 657, 78th Congress, 2d session, "with a view to determining the next

logical steps in the prosecution of the comprehensive plan of development for the Savannah River Basin.'"[62] The next designated projects in the comprehensive plan were those at Goat Island, Middleton Shoals, and Carter's Island. The study conducted as a result of the 16 July 1958 resolution considered these three dam sites in the reach of the river between Clark Hill (J. Strom Thurmond) and Hartwell. Studies were made of (1) dams at Middleton Shoals with power pools at elevations of 475 and 480 feet in combination with a dam at Goat Island with a power pool at elevation 430 feet and (2) a dam at Carter's Island with power pools at elevations 475 and 480 feet in combination with a dam at Goat Island with a power pool at elevation 375 feet. It was found that the system consisting of a dam at Middleton Shoals with a power pool at elevation 480 and a dam at Goat Island with a power pool at elevation 430 would require the relocation of a main-line railroad and a main highway and would flood a considerable area of land proposed for development of an industrial site. For this reason, a dam at the Carter's Island site with a power pool of 480 in combination with a dam at Goat Island with a power pool of 375 was selected as the most desirable system for developing the Savannah River Basin in the reach between Clark Hill (J. Strom Thurmond) and Hartwell.[63] Before this recommendation was approved, however, the State of South Carolina, represented by then Governor Ernest Hollings, expressed "strenuous opposition" to the proposal. Because the two dams were not considered essential to the development of the basin in 1960, the Chief of Engineers did not recommend their authorization.[64]

Following this unfavorable recommendation, the Board of Engineers for Rivers and Harbors held a public hearing at Savannah on 17 February 1960. Objections to the further development of the river basin were based on the belief that construction of the dams would prevent or hinder industrial development along that stretch of the stream and thus adversely affect the economy of the area. After this meeting and the unfavorable report on the Carter's Island and Goat Island Dams, a second resolution was passed by the Senate Committee on Public Works on 12 September 1961. The committee required another review of the comprehensive plan for the development of the Savannah River Basin to determine whether the recommendations should be modified "with particular reference to the advisability of constructing a reservoir at the Trotters Shoals site for flood control and allied purposes."[65] This study found that the objections raised by the South Carolina interests were largely unfounded and that construction of a dam at the Trotters Shoals site with a power pool at elevation 475 was not only compatible with the present and future planning for industrial development along this stretch of the Savannah River but also would stimulate the industrial and economic growth of the area. Recreational benefits, increased land values, and the additional employment created by the development, maintenance, and operation of the project were cited as positive features.[66]

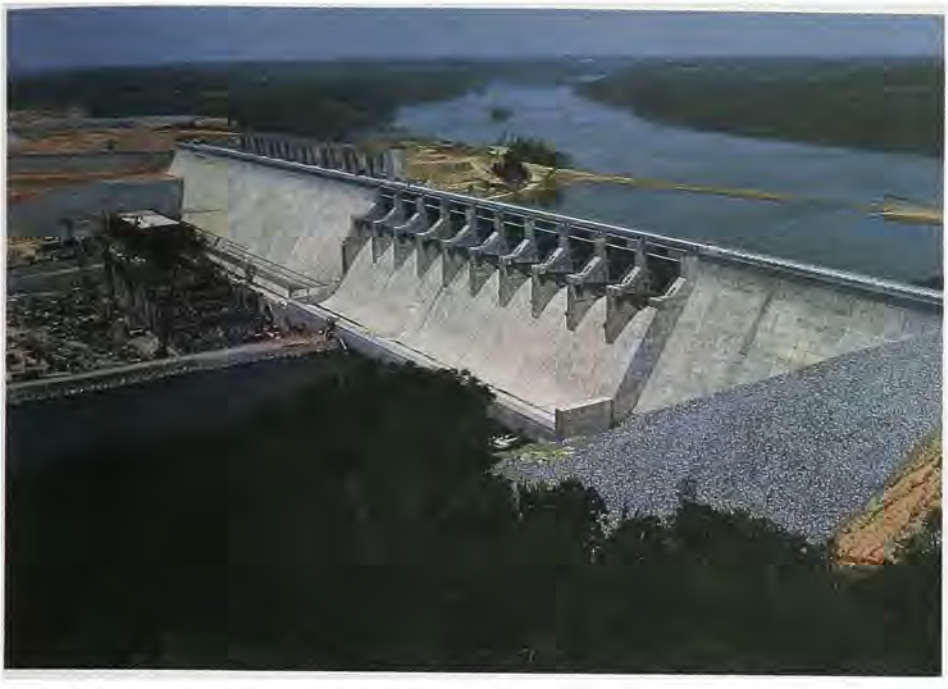
The Trotters Shoals Lake, later to be designated as the Richard B. Russell Dam and Lake project, was authorized for construction by the 1966 Flood Control Act as the third multipurpose project to be built on the Savannah River.[67] It is located 63 miles above Augusta and about 16 miles southeast of Elberton, Georgia. The initial construction contract was awarded in November 1974, and a contract for the construction of the concrete dam and power intake



*Aerial view looking south of construction beginning on the Richard B. Russell Dam. The coffer dikes extending into the river divert the water flow around the construction area. The waters in the upper left of the photograph are part of the Clark Hill Reservoir. 9 February 1977. (Savannah District, Corps of Engineers)*

was awarded in May 1978. The contract for construction of the powerhouse was awarded in August 1981, and the Savannah River was rediverted from its temporary channel to flow through the sluice gates in the overflow section of the dam in January 1982. The earth embankment on the Georgia side of the river was completed in September 1983. Filling of the reservoir behind the dam began in December 1983, and the reservoir reached anticipated pool level in the fall of 1984. The first conventional generating unit went on-line for commercial power production in January 1985. The second, third, and fourth units were placed in commercial operation in February 1985, June 1985, and January 1986 respectively. These four conventional units provide 300 megawatts of hydropower production. Maximum power production of 600 megawatts has been planned by the additional installation of four reversible pumpback units.[68] The concrete-gravity-type dam is 1,884 feet long with a maximum height of 195 feet and a spillway section containing 10 tainter gates. At maximum power pool of 475 feet elevation, there will be a 26,650-acre lake that, with the J. Strom Thurmond Lake to the south and the Hartwell Lake to the north, will form a chain of lakes approximately 120 miles long.

The National Historic Preservation Act of 1966 and the Archaeological and Historic Preservation Act of 1974 required that the Savannah District study the cultural resources within the area of the Richard B. Russell Dam project before



*Richard B. Russell Dam nearing completion, May 1983. (Savannah District, Corps of Engineers)*

the lake was filled. Working with the Archaeological Services Branch of the National Park Service, the Corps provided funds for intensive archaeological and historical investigations. These investigations were administered by the National Park Service as the contracting agent for the Corps.[69]

The Richard B. Russell project area included about 600 prehistoric and historic sites, 68 of which were excavated and documented. Researchers also interviewed numerous local residents and searched historical files and records. The Corps' goal was to make the Richard B. Russell cultural resources program a model project — one which would benefit the general public and the scientific community by documenting and preserving the cultural record of the Georgia-South Carolina Piedmont region. The four major aspects of the cultural resources program were (1) an initial survey and inventory to identify the sites; (2) archival and oral history research; (3) documentation of significant historic buildings and engineering elements; and (4) prehistoric and historic site investigations, with intensive data recovery.[70] These investigations of the cultural resources of the Richard B. Russell Dam and Lake area produced a wealth of information on the Georgia-South Carolina Piedmont. Because of the variety of cultural resources identified, the entire Russell Dam and Lake project was nominated to the National Register of Historic Places as a "Multiple Resource Area."[71]

On 7 September 1985, the Richard B. Russell Dam and Lake Dedication was held. Guest speakers included both the Governor of Georgia and the Governor of South Carolina as well as congressional Senators and Representatives from both states and the Secretary of the Army. Demonstrations were provided by the

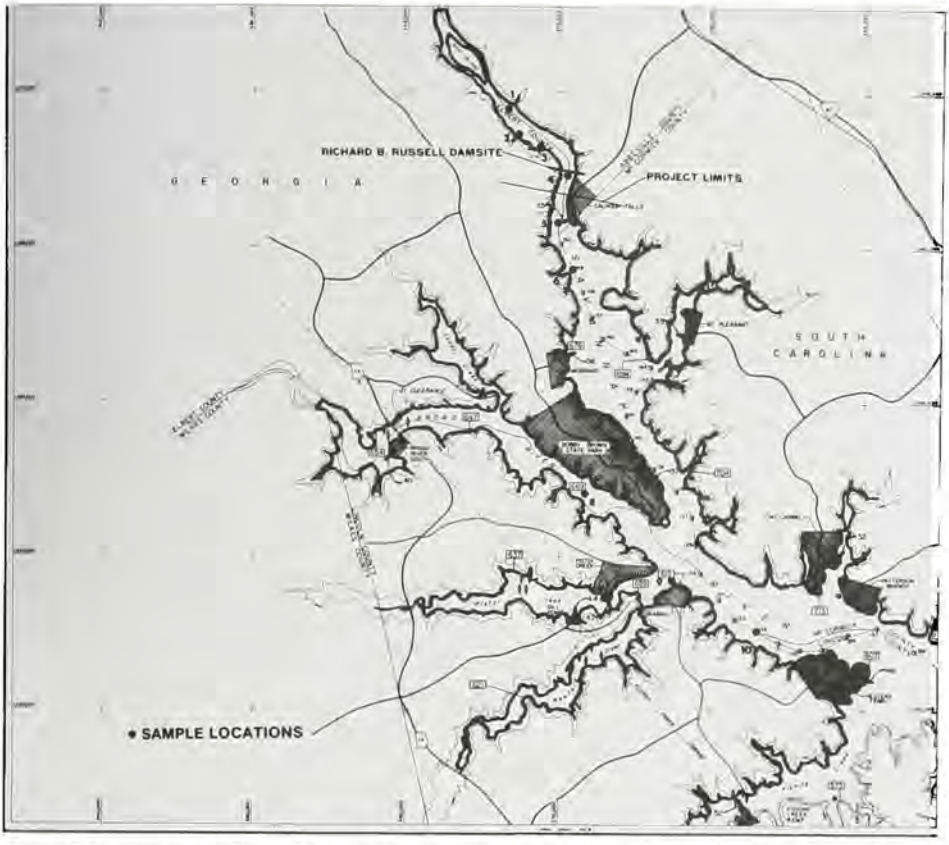


*Panoramic view of the Richard B. Russell Dam and lake. (Savannah District, Corps of Engineers)*

Army Rangers, the Coast Guard, and the Airborne Jump Troops. Singer/TV star Rick Nelson concluded the day's activities which were attended by an estimated crowd of 5,000-6,000 spectators.[72]

The Richard B. Russell project was plagued with controversy and interruptions. These came about largely because the project was authorized and initiated at a time when the American public was expressing the greatest concern for preserving the environment. For instance, in 1976 a lawsuit was filed in Federal Court seeking to halt the project because it allegedly violated federal laws that protect water quality, fish and wildlife habitats, and other environmental features.[73] While the court ruled in favor of the Corps on all issues, the District was compelled to proceed more slowly and thoroughly on the Russell project than had been the case on the other two Savannah River impoundments. This involved executing wildlife mitigation studies, cultural resources mitigation studies, water-quality studies, natural resource management plans, general environmental impact studies, and geologic seismic studies.

Some citizens were concerned that impoundment of the Richard B. Russell Lake would result in damaging earthquakes, possibly causing failure of the dam. However, taking into account possible seismic activity is a standard requirement in dam design. The Corps engaged seven private consultants (including Dr. Leland T. Long from the Georgia Institute of Technology and Dr. Pradeep Talwani from the University of South Carolina) and the WES at Vicksburg, Mississippi, to conduct seismic studies to determine the maximum earthquake force that could be expected at the site of the dam. The design of the concrete and earth structure was subjected to dynamic analyses based on these studies and was reviewed for adequacy by an Engineer Board of Review.[74]



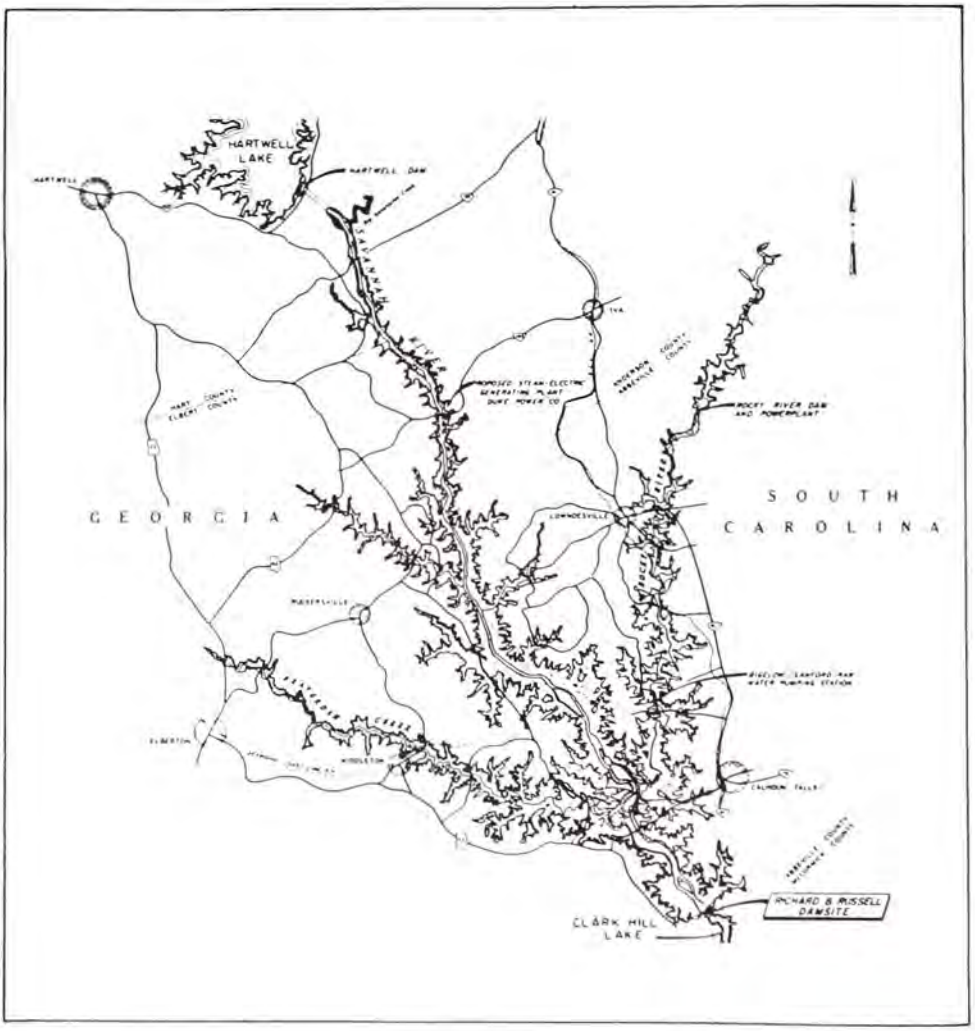

*Map of the upper reaches of Clark Hill Reservoir showing the water quality monitoring locations to satisfy environmental requirements in connection with the construction of the Richard B. Russell Dam. (Savannah District, Corps of Engineers)*

The Savannah District, in cooperation with the U.S. Fish and Wildlife Service and the States of South Carolina and Georgia, also developed a Fish and Wildlife Mitigation Plan for the Russell project. The final report, which was compiled after a series of public hearings and was sent to Congress in September 1982, recommended that provisions be made for the wildlife habitat that would be displaced by the project. Because the disposal of 3,000 acres of federal lands at J. Strom Thurmond Lake included 550 acres of designated mitigation lands in the Richard B. Russell project area, a Mitigation Report Supplement and Environmental Assessment was written to supplement the original plan. This report recommended that the disposal land be replaced with another tract at J. Strom Thurmond adjacent to other mitigation sites. Both the U.S. Fish and Wildlife Service and the State of South Carolina agreed to the terms in this supplemental report.[75]

With the assistance of both Georgia and South Carolina, a master plan was created for the recreational development and environmental management of the Richard B. Russell Dam and Lake. This master plan, which was approved on 9 November 1981, provided guidance for the detailed design, the preparation of plans and specifications, and the construction of recreational facilities on the

site. Phase I development, consisting of boat ramps, fishing piers, and access roads for both Georgia and South Carolina, was completed in August 1984. The balance of the initial recreation facilities (Phase II) was completed in 1986.[77] A cost-shared state park on the Georgia side of the reservoir was completed in 1989, and the construction on the first of four such state parks planned for the South Carolina side was begun.[78] Operation and maintenance of these parks will be handled by the states.

One unique feature of the Richard B. Russell project was the planned use of pumped storage, a process that literally pumps water back into the reservoir after it has passed through the generating units. This was expected to double the capacity of the power plants and increase the energy output 70 percent. With the four 75,000-kilowatt generators on line, the 300,000 kilowatts of pumped storage would be capable of providing more peaking power than the Clark Hill




*Map of the reservoir impounded by the Richard B. Russell Dam (the Trotters Shoals project). (Savannah District, Corps of Engineers)*

and Hartwell projects combined. Pumped storage also would result in no more than two inches of daily water-level fluctuation in the Clark Hill Lake and six inches in the Richard B. Russell Lake. This minor fluctuation would minimize the effect on fish spawning. In addition, pumped-storage facilities would provide one to two parts per million more dissolved oxygen in the waters of Richard B. Russell Lake and in its releases into Clark Hill Lake.[79]

The installation of these reversible pump turbines, however, provided perhaps the most controversial aspect of the Richard B. Russell project. On 19 April 1988 a suit was filed in the Federal District Court at Charleston, S.C. requesting an injunction against the Corps to halt the installation. The suit was filed by the State of South Carolina Department of Wildlife and Marine Resources, the Georgia and South Carolina Wildlife Federations, and the National Wildlife Federation. The grounds for the suit were failure to comply with the National Environmental Policy Act, failure to comply with the Fish and Wildlife Coordination Act, and questions regarding Congressional authority to install pumped storage at the site.[80]

This legal action grew out of concerns which environmental groups had about the safety of the fish population in the waters of the river immediately below the dam. They pointed to two other large pump-storage facilities as examples of what could happen at Russell Dam. Those sites were the Truman Dam in Missouri and the Ludington Pumped-Storage Plant on Lake Michigan in west Michigan. At both sites, massive fish kills resulted when the pump turbines were reversed and pulled water in from below the dams. The Corps contended that the situations were not similar because of different construction techniques and because of the Corps' commitment to provide screening devices which would prevent the fish from being drawn into the turbines with the water.[81]

As early as 1984, the Corps initiated a fish entrainment study to determine the potential for fish protection associated with the addition of the pump turbines at the Russell site. The study, which was coordinated with the U.S. Fish and Wildlife Service and the States of Georgia and South Carolina, involved extensive fishery data collection in the tailrace below the dam as well as in Thurmond (Clarks Hill) Lake. It was completed in September 1988 and was used as the basis for a decision to provide specific fish protection devices prior to bringing the pump turbines on-line.[82]

Despite these actions by the Corps, Federal District Court Judge Falcon Hawkins on 24 May 1988 issued the injunctions requested by the plaintiffs.[83] This decision was appealed by the Corps to the 4th Circuit Court of Appeals in Richmond, Virginia. The appeals court reversed a portion of Judge Hawkins' ruling, thus allowing the installion of the pump turbines to begin. Operation of the units, however, was made contingent upon the Corps demonstrating through an Environmental Impact Statement that the units could be operated in a reasonable manner without undue negative impacts on the fish habitat.[84] This study was planned for completion in 1989.

Another serious controversy erupted in 1988 over the Corps' policies concerning shoreline development at the Russell site. After a series of public meetings were held in November 1986 for the purpose of explaining the shoreline policies, questions began to be raised by local groups concerning a manda-



*View of lakeshore, Richard B. Russell Lake, illustrating the 300-foot set-back requirements for development. (Savannah District, Corps of Engineers)*

tory 300 foot setback for private development around the reservoir. They contended that this policy was impeding the economic development of the area. District Engineer, Col. Stanley Genega responded that "The Congressional authorization for the construction of the project was based on the generation of hydroelectric power, flood control, and public recreation. Area redevelopment is not a project purpose."[85] Another explanation was offered by Richard Downing, Chief of Operations in the Savannah District in February 1988. He advised that changes in Corps management policy prohibited private development on lakes which were completed after 1974 because development on some lakes was getting out of hand and hampering Corps efforts to manage lakeshore property for the benefit of most people.[86] Because Richard B. Russell Lake was built after that deadline, the Corps could allow no private development on its immediate shoreline.

Early in 1988 a Lake Russell Steering Committee was formed for the purpose of putting organized pressure on the Federal Government and the Corps to gain the desired concessions for lakeshore development around the Russell reservoir. The group indicated there were three goals in particular they were seeking: community docks at the lake, use of 25 percent of the shoreline for development, and permission for the property owners adjacent to the 300 foot "collar" to clear the underbrush and limbs in order to gain access to the lake.[87] While the District Office in Savannah maintained they had no control over the shoreline policy under dispute since it was a national policy, the controversy became part of a larger conflict over Corps priorities for the use of the various impoundments on the Savannah River. This conflict was precipitated as a result of the severe drought conditions which the area experienced from 1986 through 1988.

One interesting side development of the disputed shoreline policy was the case of Mrs. Louise Brown, an elderly widow whose home was within 100-150 feet of the water when the reservoir was filled. The Corps had purchased the farm site from her husband at the time land was being acquired for the reservoir. Because of the ill health of Mr. Brown, however, the Corps failed to understand that Mrs. Brown held an undivided interest in the property. In 1984 Mrs. Brown was cited by the Corps for cutting trees and underbrush along the lake's edge, and was subsequently brought into court for violating Federal regulations. In July 1988, U.S. Magistrate Claude Hicks of the Middle Judicial District of Georgia heard the Corps case against Mrs. Brown. At that time the defense counsel introduced the information that cast doubt on the Government's claim to fee simple ownership of the land. Judge Hicks, therefore, was compelled to rule against the Corps. Mrs. Brown's attorney commented, "She may be the only person in the country who owns property jointly with the United States Government."[88]

Not all of Russell's early history, however, was negative. In January 1986 the concrete dam and powerhouse was awarded Honorable Mention in the Engineering Category of the Corps-wide Chief of Engineers Design and Environmental Program. This was one of five awards which the Savannah District earned in this program.[89] In addition, the lake's Natural Resource Management Center and the Powerplant Visitor Center were opened with formal ceremonies on 20 November 1987. The unique displays in these visitor areas include a 10 ft. by 40 ft. replica of the corner of a typical early mill of the Piedmont region, a 23 ft. by 13 ft. photo mural showing an inside perspective of an early two-story



*The award-winning Richard B. Russell concrete dam and powerhouse. (Savannah District, Corps of Engineers)*

mill, exhibits on the history of the Corps of Engineers and the Richard B. Russell Dam and Lake project, a summary of information obtained as a result of the Corps' Cultural Resources Mitigation Program at Richard B. Russell, and other exhibits of interest related to the work of the Savannah District, the Russell project, and the Savannah River in general.[90]

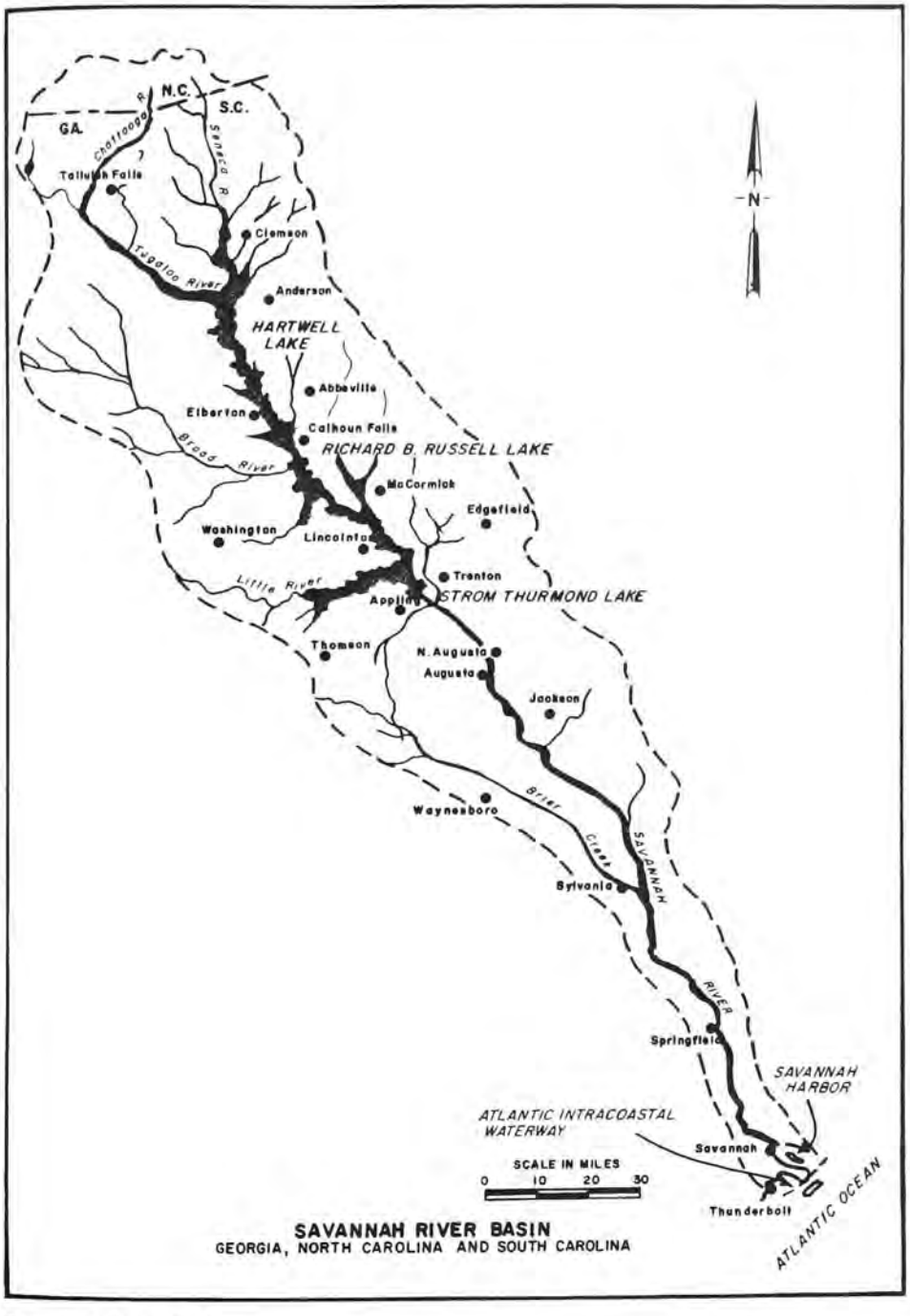
From late spring until October the lake tended to stratify as do most lakes in the Southeast. The top 30 to 50 feet would normally contain high concentrations of dissolved oxygen year-round due to the penetration of light and the mixing action of the wind. (Bass, crappie, bream, and other species have been found in this upper strata of the lake.) However, in the cooler lower depths, the dissolved oxygen level would normally decline gradually, reaching the lowest levels during midsummer. At these times, generator releases might no longer meet the state water-quality standard for dissolved oxygen of five parts per million. To rectify this condition, the Corps developed an oxygen injection system capable of increasing the dissolved oxygen in power releases to six parts per million. This system was installed and operated at Russell Lake. As a result, the project was one of the few hydroelectric developments in the Southeast where state water-quality standards for released water are met year-round.[91] The lake, therefore, provides high-quality water to accommodate water-oriented recreation activities such as boating, swimming, and fishing.

## DROUGHT CONTINGENCY PLANNING

The vital interrelationship among the three Corps impoundments on the upper Savannah River was made evident in 1986 through 1988 when perhaps the worst drought in the twentieth century created severe water shortage conditions over extensive areas of the southeastern United States. At the three Corps reservoirs, inflows were the lowest recorded since their construction. The original purpose for these dams and reservoirs was to control floods and improve navigation; during the 1986-1988 crisis there emerged the necessity of drought planning.

Under normal conditions the Corps lowers the water levels in all of the reserviors during the winter months in order to accomodate the spring rains. It is an annual procedure; in the spring of 1986, however, the rains never came. By August the water level at Clarks Hill (J. Strom Thurmond) was down 8.2 feet below normal pool level. A Corps spokesman commented, "It's the worst that it's ever been. What happened was we got caught with our lakes down, and the spring runoff never came." As a result of this condition, the question concerning the relative priorities of hydropower generation vs. recreation and water conservation arose for the first time.[92]

In September 1986 the Corps planned to reduce the flow of water through the dams from 4,700 cubic feet per second (cfs) to 3,600 cfs. (the minimum required for downstream activities). This announcement raised concerns from environmental groups along the lower Savannah River about salt water intrusion into the lower reaches and contamination of the fresh water marsh included in the Savannah National Wildlife Refuge. Saltwater intrusion had been a problem at that site since the Corps installed tide gates in the Back River to establish a natural dredging process through the Front River and Savannah Harbor. In order to meet this objection, the Corps installed salinity monitors at several




*Savannah River Basin*




*Illustration of the severity of drought conditions at Hartwell Lake, summer 1988. (Savannah District, Corps of Engineers)*

points along the river and at the Wildlife Refuge when the flow through Thurmond Dam was reduced.[93]

By October 1986 drought conditions in eastern Georgia had become critical. Hartwell Lake was 13.2 feet below normal level; Russell was 4 feet below; and Thurmond was 13.1 feet below.[94] Fortunately, in late October rains began raising the lake levels, and by the end of November power generation was increased at Hartwell and Russell. This provided some relief for the Southeastern Power Administration which was forced to spend approximately $10 million in 1986 to purchase power as replacement for the power that normally would have been generated in a non-drought situation.[95] Above average rainfall during the ensuing winter months brought lake levels above their normal operating levels by February 1987.[96] The 1986 drought, however left a legacy of concerns.

The summer and fall months of 1987 brought another deficit of rainfall and by January 1988 residents and local interests around the lakes were complaining that the low water levels were damaging business activity. Some groups expressed the complaint that the Corps was releasing too much water from the reservoirs in order to generate electricity, and this time Rep. Butler Derrick (D-S.C.) made a formal request for the General Accounting Office to probe the way the Corps managed the river and its reservoirs.[97] Throughout the summer months of 1988, the controversy continued as the drought intensified.

In July 1988 the General Accounting Office released its preliminary findings from the study which was conducted in response to Rep. Derrick's request. The conclusion was that the Corps lacked a contingency plan to manage the upper Savannah River lakes during drought, even though regulations approved in

1981 required them to develop such a plan.[98] The Corps had been in the process of developing the contingency plan since 1986, but the first draft was not completed until August 1988. During the month of September a series of public meetings were held for the purpose of gaining input prior to publishing the final document. The completed Savannah River Basin Drought Contingency Plan was then published in March 1989.

The Drought Contingency Plan stated that "The difficulty in accurately defining the beginning of a drought as it is occurring hampers the ability to make appropriate management responses." Some indicator or triggering mechanism was deemed necessary to initiate action before a crisis occurs. The indicator that was chosen was lake level because it had the advantage of simplicity. "Using lake levels for a triggering mechanism is readily understandable by the public, and easily implemented requiring no complex computations." The study went on to assert that a significant development of the Contingency Plan was the establishment of the Savannah River Basin Drought Coordination Committee composed of representatives from the Corps of Engineers and the States of Georgia and South Carolina. This committee was created to provide for improved communication and information exchange among the agencies involved.[99]

The water levels established as triggering mechanisms for drought control action fell into two monitoring periods for both the Hartwell and the Thurmond reservoirs. The Russell pool level would not be used as a triggering mechanism because of the limited draw /down at that project. For the Hartwell project the monitoring periods would be from 18 April to 15 October and from 1 December to 1 January. For the Thurmond reservoir the monitoring periods would be from 1 May to 15 October and from 15 December to 1 January. Reduction in lake levels to specified measures would automatically trigger specific sequential reductions in the outflow down to the absolute minimum flow required for effective operation of downstream interests. Reductions beyond this minimum flow would require that outflow equal inflow.[100] However, as a Corps spokesman remarked, "That's where it all hits the fan. At that point everybody gets hurt. That's the bottom of the conservation pool."[101] All of these actions would include coordination with the States of Georgia and South Carolina through the Drought Coordination Committee.

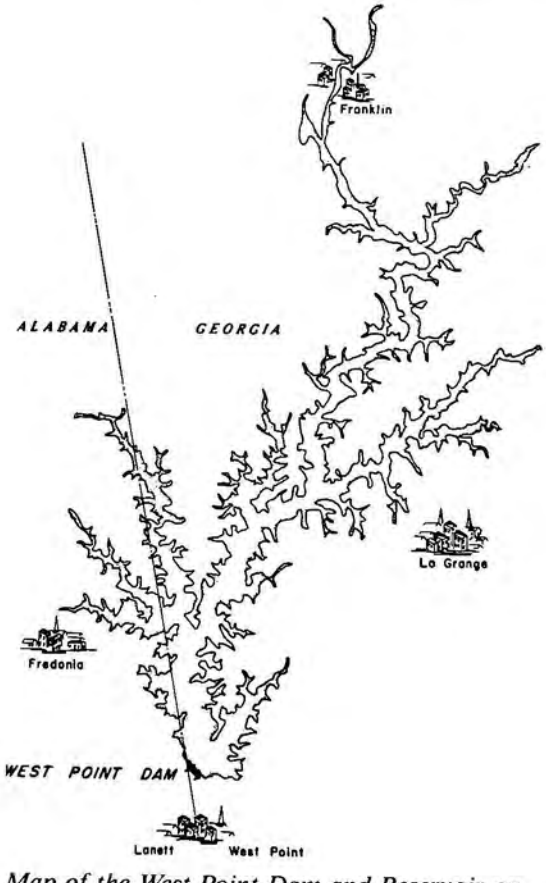
## THE WEST POINT PROJECT

The Flood Control Act of 1962 authorized construction of the West Point Lake on the Chattahoochee River, approximately three miles north of West Point, Georgia, for the purposes of flood control, power, recreation, fish and wildlife protection, and navigation. The Savannah District became responsible for design, acquisition of land, and construction. Construction was started in 1966, and the concrete dam was completed in 1970. Impoundment of the lake began in October 1974, the power plant was completed in 1975, and the power plant was in full operation by April 1975. The Mobile District is responsible for the project's operation and maintenance.[102]

The West Point project had many firsts to its credit. It was the first time that the Corps of Engineers used the slurry trench technique in dam construction. The slurry trench was constructed by digging a trench 28,000 feet long, 5 feet




*Flood waters from the Chattahoochee River inundate West Point, Georgia before construction of the West Point Dam. (Savannah District, Corps of Engineers)*




*Map of the West Point Dam and Reservoir on the Chattahoochee River in western Georgia. (Savannah District, Corps of Engineers)*



*Four participants stand ready for the detonation exercise that signalled the start of construction of the West Point Dam project. Left to right: Congressman George Andrews (Ala.); Congressman John J. Flynt. Jr. (Ga.); Major General George H. Walker, South Atlantic Division Engineer; and Schaefer Heard, who initiated the process which brought the project into being. April 1966. (Savannah District, Corps of Engineers)*

wide, and 40 feet deep with a dragline and then backfilling the trench with a mixture of Bentonite and water, commonly referred to as drilling mud. This process created a membrane under the embankment to prevent seepage under the concrete portion of the dam. The West Point project was also the first time the Corps used hydraulically driven tainter gates, which were more effective and cheaper to operate than earlier mechanically driven gates. Another economy measure was the use of larger tainter gates, 50 feet wide by 41 feet high, instead of the more conventional 40 feet by 35 feet. These innovations, referred to as "value engineering," saved the Government approximately $320,000 in construction costs.

This project has provided opportunities for boating, water sports, camping, picnicking, hunting, fishing, and nature studies. As presently planned, 44 public use areas will encircle the lake area. This includes 11 parks, 27 access areas, a public overlook, 4 marinas, and a 2.5-acre fishing pond for preteen children. A campground, an amphitheater, beaches, playground facilities, game courts, softball diamonds, fishing piers, wildlife pounds, and a small-bore rifle and pistol range are provided also. The handicapped will have access to all facilities. Local governments and private enterprise are providing additional recreational



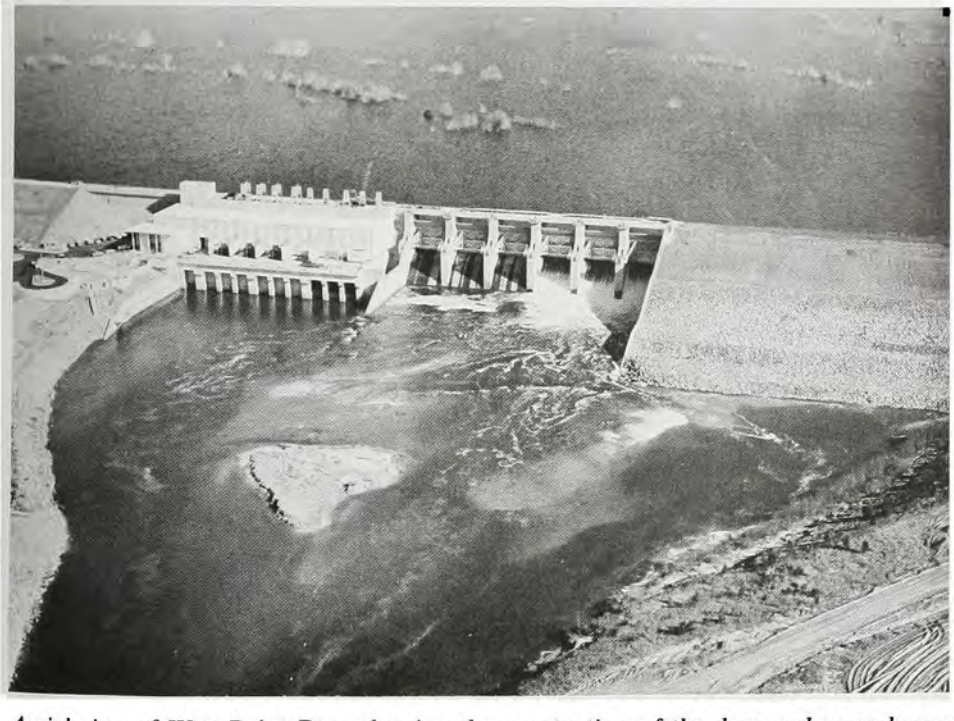
*Aerial view showing construction underway on the West Point Dam on the Alabama side of the Chattahoochee River. Note the natural river channel, the diversion channel, and the cofferdam built around the construction area. (Savannah District, Corps of Engineers)*



*Aerial view showing the powerhouse under construction at West Point Dam. Notice the flat floodplain area in this section of southwest Georgia and southeast Alabama. January 1973. (Savannah District, Corps of Engineers)*



*Aerial view of West Point Dam showing the diversion channel closed and the river flowing through its original channel to pass through the sluice gates. (Savannah District, Corps of Engineers)*



*Aerial view of West Point Dam showing the constuction of the dam and powerhouse nearing completion and the river waters being impounded behind the dam. (Savannah District, Corps of Engineers)*



*View from the rear of the completed West Point Dam showing the impounded lake waters. (Savannah District, Corps of Engineers)*



*This Chattahoochee River bridge was named the "Prize Bridge" in the Medium Span Low Clearance category in the 1974 competition sponsored by the American Institute of Steel Construction, Inc. The bridge was built in connection with the West Point Dam project which required the relocation of Georgia Highway 219. March 1974. (Savannah District, Corps of Engineers)*



*Aerial view showing a West Point public use area being laid out prior to impoundment of the reservoir. Notice the reservoir area has been cleared of timber. (Savannah District, Corps of Engineers)*

areas. As a result of the development of these comprehensive facilities, the Corps of Engineers designated West Point Lake as a recreational demonstration project. In April 1981 the Savannah District completed the master plan for the lake to ensure orderly future development and protect environmental values.[103]

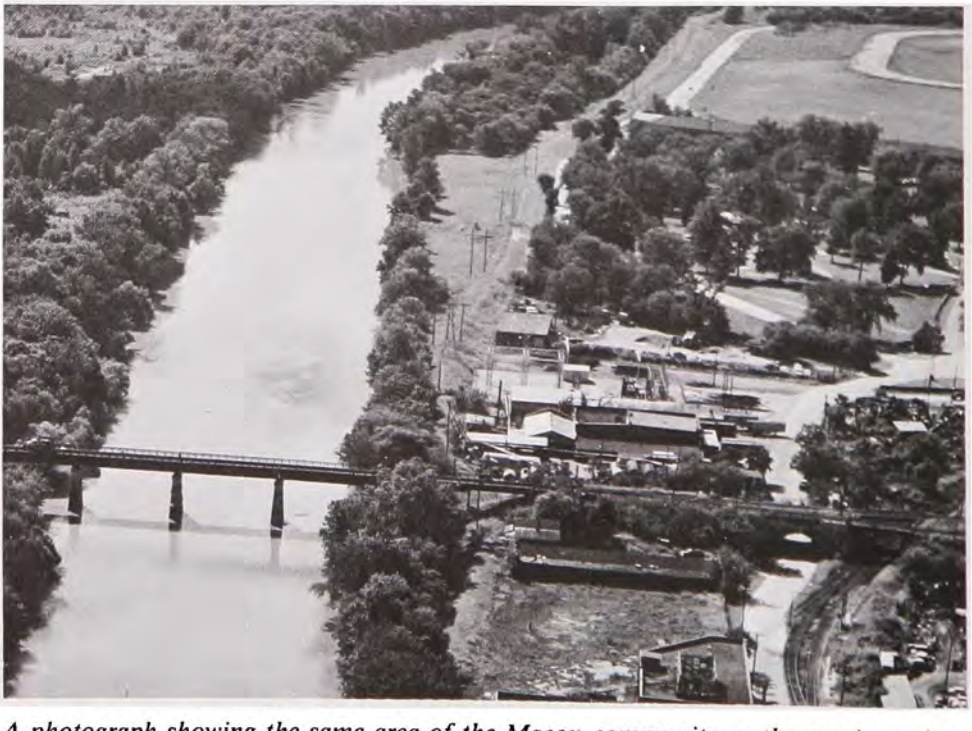
## THE MACON LEVEE

While constructing no multipurpose reservoirs on the Altamaha River system, the Savannah District has completed flood control studies and one flood control project. Under the authority of the Flood Control Act of 1936, the District carried out a preliminary examination and survey of the Altamaha River, and submitted a report in February 1946 concerning flood problems in the vicinity of Macon, Georgia.[104] Residents of that city requested that the Corps of Engineers effect improvements to protect the industrial area on the west bank of the Ocmulgee River and the farmlands to the south. Local residents offered to furnish the necessary lands for the construction of a levee system and to maintain the levee after its completion.

The study of the flooding problem in the Macon area examined the use of reservoirs on the river above Macon but concluded that the necessary reservoir capacity could not be developed at the available sites. In addition, the cost would have been much greater than the benefits. Another alternative, clearing



*A photograph showing a portion of Macon, Georgia, flooded by the rise of the Ocmulgee River in 1948 before flood protection procedures had been carried out. (Savannah District, Corps of Engineers)*



*A photograph showing the same area of the Macon community as the previous view. Notice the levee has been constructed along the bank of the river. 1965. (Savannah District, Corps of Engineers)*

and deepening the floodway and river channel, would have lowered the flood levels, but the cost of clearing and maintaining the floodway would have far exceeded the benefits derived.[105]

The 1946 study concluded that flood protection for Macon could be furnished economically only through a system of levees along the west bank of the Ocmulgee River. With the goal of protecting its industrial areas against floods having a maximum stage of 30 feet on the Macon gauge, benefits were found to justify the cost of building the levees. Therefore, the project was authorized by the Flood Control Act of 1946. It was completed in October 1950 and turned over to local interests in January 1951. Minor construction deficiencies were corrected in 1975, and the project was returned to the city and county governments for operation and maintenance.[106]

The Corps of Engineers' flood control responsibilities in the 1930s led to an interest in the concept of multipurpose river basin development in the post-World War II era. The Savannah District became involved in this area of activity primarily in connection with the development of the Savannah River Basin above Augusta. The Clark Hill, Hartwell, and Richard B. Russell projects include three dams that are part of a comprehensive program of flood control, power production, navigation improvement, and recreational benefits embracing the entire upper Savannah River and its tributaries. Since the authorization of the comprehensive plan in 1944, several modifications have been made. The Newry-Old Pickens Dam site on the upper Seneca River above Clemson has been dropped from the Corps' plan and is being developed by the Duke Power and Electric Company. The four dams and reservoirs planned for the Chattooga River have been eliminated because that river has been designated as a wild waterway and is being protected from development. Whether the two remaining dams, Anthony Shoals and Tallow Hill on the Broad River, will be developed in the near future is questionable. Hydroelectric power and flood control are not the urgent needs they once were, and recreational opportunities are being provided by the existing reservoirs. The era of the great dams may be drawing to a close in Georgia. However, the three Savannah District plants on the upper Savannah River stand as symbols of the engineering skills developed in response to the needs of an expanding population in the mid-20th century.

# 16 NEW CHALLENGES FOR THE CORPS

In the 1960s the work of the Savannah District was transformed by a growing national awareness of the need to preserve the environment. The resulting torrent of environmental legislation in the 1970s created major changes in the District's role as a planning and regulatory agent. As a consequence, the District was diverted from large-scale civil works projects such as dams and reservoirs toward smaller and more environmentally oriented works. Examples of these more limited activities that have dominated the time and attention of the District are civil defense and disaster relief programs, small flood control projects, flood plain management services, beach erosion control projects, water-resource management studies, liscensing and permit activities, and small-dam safety inspections.

In the midst of the buildup of the Cold War in 1954, Chief of Engineers General Samuel D. Sturgis visited Savannah and remarked that the majority of American shipping facilities, including those in Georgia, were dangerously concentrated and vulnerable to atomic attack. "They could wipe out most of our Atlantic shipping in one or two blows," he said.[1] After inspecting port facilities and construction programs at Hunter Air Force Base, Sturgis remarked again on the general lack of progress in developing defense measures.

In 1961 an Executive Order from President John F. Kennedy assigned civil defense responsibilities to the Secretary of Defense and others in the executive branch.[2] This delegation of responsibilities was made pursuant to the Federal Civil Defense Act of 1950 and included, among other items, the development and execution of a fallout shelter program.[3] The same Executive Order authorized the Secretary of Defense to redelegate within his department the functions that the President had delegated to him. On the same date, Robert S. McNamara, Secretary of Defense, issued a statement declaring that "in an age of thermonuclear war, civil defense must be integrated with all aspects of military defense against thermonuclear attack," and that the civil defense effort must remain basically under civilian direction and control, "involving, as it does, the survival of every citizen."[4] McNamara then went on to direct that the Federal civil defense program would be organized within the Department of Defense as a civilian function, drawing on the military departments for necessary support. For example, the Corps of Engineers "could be utilized in planning and directing the survey marking and improvement of available fallout shelter space in

existing construction."

The next month the Secretary of Defense issued a memorandum to all state and local civil defense directors indicating that the government program gave first priority to the fallout shelter survey, which was intended to identify and mark the largest amount of space that was available for a substantial portion of the population and to stock that space with the minimum essentials for survival.[5] The District Offices of the Corps of Engineers were to provide personnel (largely civilian) who were trained in how to instruct others in identifying and marking available fallout shelter space "in existing buildings, tunnels, subways, caves and other protected areas." Private architects and engineers were to be contracted to assist in this national fallout shelter survey.[6]

The Savannah District Office under Colonel Wilbur Stevens, District Engineer, was in charge of this program in Georgia. The District conducted orientation programs for professional engineers and civil defense officials, and contracted with twelve architect-engineer firms to carry out the survey in Georgia. By October 1962 the survey had identified and marked 1 building in Atlanta, 3 in Macon, 4 in Albany, 3 in Thomasville, 19 in Savannah, and others scattered throughout the State. Shelter spaces for 815,000 persons had been provided.[7] In 1968 District Engineer, Colonel William Barnes announced that four million spaces had been furnished throughout the State as a result of the shelter survey program.

While civil defense work continued in the State for several years, the decline of international tensions caused a change in the shelter program. By 1980 the shelters had come to be used primarily during natural disasters such as the approach of Hurricane David in September 1979.[8] Food and other supplies stored in the shelters since the early 1960s had lost their shelf life and had been disposed of or sold off to feed farm animals.[9] Evacuation plans were no longer taken seriously, and the yellow and black signs marking the shelters had turned orange from age and rust.

During the late 1970s, other small projects became an important part of the District's work. Section 205 of the Flood Control Act of 1948 provided for the construction of small flood control projects not specifically authorized by Congress when, in the opinion of the Chief of Engineers, such work is advisable.[10] In order to qualify, a project must constitute a total solution to the flood problem so that the Federal Government is not called on to make additional improvements. In addition, the project is subject to the same feasibility and economic requirements as those authorized by Congress. Under the authority of Section 205 of the 1948 Flood Control Act, as amended, the Savannah District conducted the Casey Canal Flood Control Study. The study was to investigate flood problems along Casey Canal in Savannah. Intense rainfall, when combined with high tides, caused widespread flooding because of the tidal action that restricts drainage through the canal.[11] The reconnaissance study was completed in May 1975, and a detailed project study was approved in July 1975. The study began in 1978, but was interrupted by a public controversy over the proposed construction of the Truman Parkway through the project area.

The Detailed Project study was reactivated in January 1981 after the delay caused by the Truman Parkway controversy. A preliminary report was com-

pleted and dissiminated for public comment in December 1983, but completion of the study was again put on hold in May 1985 as a result of Chatham County deciding to design an alternate road, the Casey Canal Parkway. This proposed design involved re-routing and modification of the Casey Canal. Using some of the data included in the unfinished Detailed Project Study, the Savannah District worked with the City of Savannah to determine the effects of the proposed new roadway.[12] The District planned to re-evaluate the hydraulics after the completion of the roadway to determine if further improvements would be needed for flood damage control. Meanwhile, the Casey Canal continued to cause significant flooding problems for the City.[13]

Savannah and Chatham County also asked that the Savannah District help solve the flood problems along Placentia Canal under the authority of Section 205. This watershed was highly developed, and many residential, commercial, and institutional buildings were located in the flood plain. The Savannah District completed a reconnaissance study in February 1982, which proposed further investigation. Detailed studies began in August 1982 and a Detailed Project Report (DPR) on the study was completed in December 1986. The recommended plan called for a small levee along one-half mile of the channel with channel-widening improvements at another location in the canal. Modifications to several road crossings were also recommended. The Savannah District planned to secure a Local Cooperation Agreement with the City of Savannah and begin work on the improvements in 1989.[14]

Because of flooding along Springfield Canal, local interests in Savannah and Chatham County sought the Savannah District's aid in 1982. Under the authority of Section 205, the District completed a reconnaissance study and found that most of the land in the watershed was cleared, resulting in rapid runoff rates. Hence, during intense rainstorms, Springfield Canal could not drain the storm water fast enough to prevent flooding. The result was the flooding of both residential and commercial structures. Detailed studies of this problem began in August 1982, and a Draft DPR was completed in March 1987. The tentatively selected plan consisted of channel improvements and modifications to several road crossings in order to allow the channel to accomodate an increased flow of rain run-off. Negotiation of a draft Local Cooperation Agreement with the city of Savannah and completion of the Final Detailed Project Report were planned for mid-1989.[15]

The City of Dublin, Georgia and the Board of Commissioners of Clayton County, Georgia also requested the assistance of the District in solving the flood problems along Hunger and Hardship Creek in Dublin and Reeves Creek near Jonesboro in Clayton County. An initial appraisal was made at both locations under the authority of Section 205 of the 1948 Flood Control Act as amended. It was determined that improvements to reduce flood damages are likely to be economically feasible in both locations, and more detailed studies were initiated with completion planned for 1989.[16]

Other 205 projects which were completed by the Savannah District were at Dunn Branch in the Satilla River System near Woodbine, Georgia, and at Peacock Creek in the Ogeechee River System near the Fort Stewart Military Reservation in Liberty County, Georgia. These projects are inspected annually as required under Title 33, Code of Federal Regulations, and reports of inspec-



*A view along the Oates Creek Flood Control project area in Richmond County, Ga. (Savannah District, Corps of Engineers)*

tion findings are furnished to the local agencies for action. During periods of high water, these structures are under frequent surveillance.

A small flood control project which was not associated with the 205 authorization was the Oates Creek Project for Augusta-Richmond County, Georgia. Oates Creek flows into Phinizy Ditch and Beaver Dam Ditch, which are tributaries of Butler Creek. Butler Creek flows into the Savannah River downstream of the New Savannah Bluff Lock and Dam. Much of the upper part of the watershed lies within the city limits of Augusta, while the lower part is within unincorporated Richmond County. The major problem along Oates Creek was frequent and severe flooding which caused average annual damages of approximately $1.82 million. At the time of the study there were 227 houses, 54 industrial or commercial buildings and 2 apartments subject to possible flooding.[17]

The final report on flood control for Oates Creek was submitted to Congress in December 1983 by the Secretary of the Army and was approved in January 1984.[18] The Water Resources Development Act of 1986 included funding for this project at the rate of 25-30 percent by non-federal sponsors.[19] In March 1988 a Local Cooperation Agreement was signed with Richmond County as the local

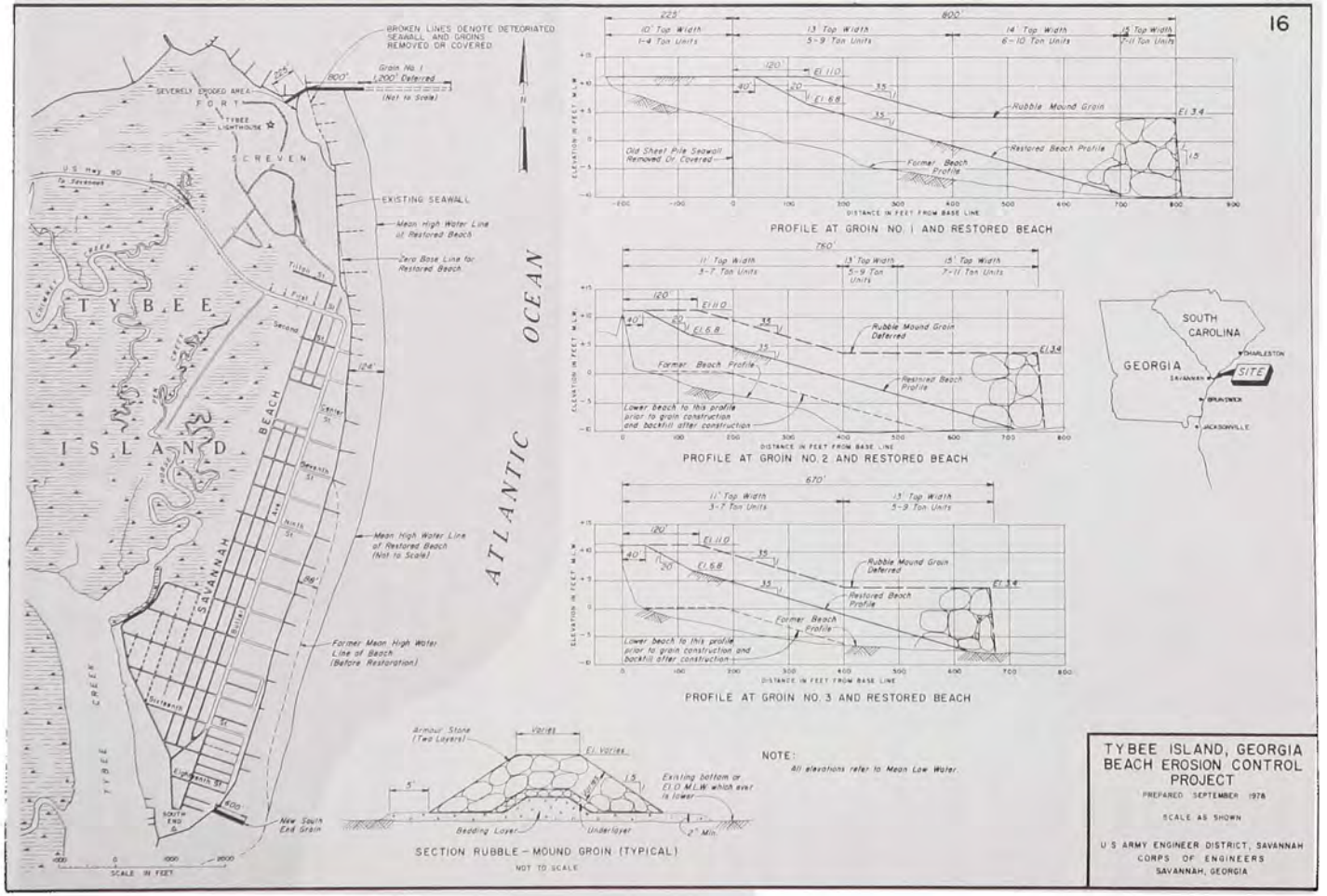
sponsor, and work on the plans and specifications for channel construction and improvement began in 1989.[20] The recommended project was a channel and bridge modification plan calling for improvements to approximately 12,300 feet of channel. These improvements included concrete and grass-lined channels, a low levee, modifications of bridges and culverts in 16 locations, and relocations of utilities.[21]

The Savannah District has provided a variety of flood plain management services under the authority of Section 206 of the 1960 Flood Control Act. This act authorizes the Corps of Engineers to provide information, technical planning assistance, and guidance to nonfederal agencies in identifying flood hazards and planning the wise use of flood plain land.[22] Under this authorization, the Corps established a program to assist in reducing the risk of floods; minimizing the effect of floods on human safety, health, and welfare; and restoring and preserving the beneficial values of flood plains. The Savannah District's flood plain management program was based on requests from local and state agencies.

One of the District's more significant flood plain management programs related to flood insurance studies. The Federal Emergency Management Agency (FEMA) administers and funds the Flood Insurance Study Program for which the Savannah District has served as the contractor from time to time. The Flood Insurance Study reports establish flood insurance rate zones and provide other data for administering the Federal Flood Insurance Program. These reports determine the premiums that private homeowners and commercial interests will pay for flood insurance in flood plain areas, as well as establish the criteria for new construction in these areas. As of 1989, the Savannah District had completed 27 flood insurance studies in Georgia and 13 in South Carolina.[23]

In June 1971 Congress approved the Tybee Island Beach Erosion Control project for the Savannah District under the authority of Section 201 of the Flood Control Act of 1965.[24] The project, which was designed to improve the shoreline of Tybee Island, began in November 1974. The work involved restoring approximately 2.5 miles of shoreline beginning at the north end of the island. The first contract was awarded for construction of a 800-foot rock groin at the north end of Tybee Island near the Tybee Lighthouse and was completed in June 1975. The second contract provided for placement of sand along the entire length of ocean front. The sand was removed by hydraulic pipeline dredged from a massive sandbar area off of the south end of the island. This work, which was completed in April 1976, provided approximately 124 feet of beach seaward of the seawall which was accessible at average high tide, thus doubling the public beach area.[25] Beach monitoring and periodic renourishment were included in the original project plan, contingent upon local cooperation and cost-sharing. As an indication of the local interest in this project, some residents volunteered to serve as "beach watchers" to monitor the stability of the erosion control program. The monitoring program included not only the conventional land survey methods, but also aerial photography and hydrographic studies made from boats. Due to the lack of funds, no surveys were conducted between FY 81 and FY 84.[26]

The original Tybee Beach project called for 10 years of Federal participation in the renourishment program following initial nourishment. The first of the




# TYBEE ISLAND, GEORGIA BEACH EROSION CONTROL PROJECT

PREPARED SEPTEMBER 1978

SCALE AS SHOWN

U S ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

scheduled nourishments, which was to take place during FY 79 was delayed in order to conduct further studies of the causes of erosion. These studies were completed in 1981 and resulted in a plan which recommended constructing a groin at the south end of the beach, raising the existing groin at the north end, and another renourishment program. However, before these improvements began, the State of Georgia felt that other efforts should be made to see if other alternatives were available. To accomplish this review, the State formed the Tybee Island Technical Task Force in late 1983. The task force, which included the Savannah District, Corps of Engineers, was comprised of several distinguished coastal experts. This group agreed with the proposal for constructing the south-end groin, raising the north groin, and renourishing the beach.[27]

In June 1986 the contract for the modification/rehabilitation of the north-end groin and construction of the south-end groin was awarded. This phase of the project was completed in February 1987 at the same time that a contract was awarded for the placement of beach fill material.[28] An added benefit of this work was that the construction of the south-end groin cost one-third less than was allotted, and the excess funds allowed for additional beach renourishment at the extreme southern tip of the island.[29] This total project, which was 51 percent funded by State monies, was considered at its completion as, at best, a temporary solution to the problem of beach erosion. Renourishment will have to be renewed periodically.[30] Federal participation in periodic nourishment of the beach is limited to 15 years following project construction according to the original project. The Water Resources Development Act of 1986, however, provided authority to the Secretary of the Army to extend Federal participation in renourishment up to 50 years if deemed appropriate. Before that authority can be exercised, a study must be requested and conducted to determine the Federal interest in any extension of Federal participation. Both the city of Tybee Island and the State of Georgia were informed of this requirement since the original project limitation would expire in September 1989.[31]

The District conducted a similar beach erosion control study for Jekyll Island, Georgia, and submitted a report to Congress in 1976. The study was to determine the causes of erosion at the north end of the island and to develop a plan for restoring the beach and protecting against further erosion and hurricane damage. The proposed plan called for restoring 27,000 feet of protective and recreational beach and provided for the periodic nourishment of the ocean shoreline and the construction of a 1,000-foot groin at the north end of the restored beach. The plan drew heavy criticism from environmental groups in Glynn County, especially the provision to build a groin at the north end that would extend into the sound. These groups claimed that insufficient information was available to determine the groin's effects on the beach area of the adjacent St. Simons Island. Because of this opposition, the plan was abandoned.[32]

Hurricanes are disasters with which flooding as well as beach erosion and coastal damage is often related. They are, therefore, a primary concern for residents along the Georgia coast, and the Savannah District has constantly reviewed plans and procedures to reduce hurricane damage. Within the District organization, the Emergency Planning Management Division has been concerned with this role. Organized in 1981, this division has reflected a national

concern for quick and coordinated reaction to disasters, whether natural or man-made. In October 1985 the Flood Plain Management Service Branch within the Planning Division began conducting a three-year Coastal Georgia Hurricane Evacuation Study in cooperation with state and local officials and agencies. The study was cost-shared by the Federal Emergency Management Agency, the National Weather Service and the Corps of Engineers.[33]

The purpose of the study was to provide local and state officials with a complete information base for hurricane planning and decision making. A major part of the study was to determine what areas are at risk and when. To accomplish this, the Planning Division made use of the National Hurricane Center's state-of-the-art computer model called SLOSH, an acronym for Sea, Lake and Overland Surges from Hurricanes. The model predicted tidal surge heights and wind speeds resulting from hurricanes using barometric pressure, size, forward speed, track, and wind speed.[34]

Other features of this study were a behavioral analysis to determine how people would react in a hurricane; a transportation analysis to establish evacuation lead times; a vulnerability analysis to identify and evaluate levels of vulnerability, the region-wide system of evacuation zones, the population-at-risk, and special evacuation needs of institutional/medical residents; and a shelter analysis to inventory and determine the capacity of existing public shelters as well as to determine projected shelter needs.[35] This comprehensive study was underway when the Water Resources Development Act of 1986 was passed and included an amendment to Public Law 84-99 which allowed the U.S. Army Corps of Engineers more leeway in assisting flood or coastal storm-afflicted areas.[36] Prior to this amendment, the Corps could only help local government and municipalities prepare for a disaster up to the time it actually occurred. Beyond that, the Corps had to wait until FEMA (Federal Emergency Management Agency), at the state's request, came in and conducted a damage survey to see if the area could qualify as a disaster area and thus be granted a declaration of disaster by the President of the United States. After such a declaration, FEMA would then task the Corps with various mission assignments.[37] Needless to say, this created a time span in which the local residents had no outside help at all.[38] An example of this earlier damage repair role of the Corps was in 1964 when Hurricane Dora left areas of Tybee Island, St. Simons Island, Sea Island, and Jekyll Island in need of emergency shore protection. These protection works generally consisted of large granite boulders being hauled in and placed along the shoreline where erosion from the storm was most severe. The boulder riprap prevented further erosion from wave action and entrapped sand deposits that would renourish the beach.

The amendment included in the Water Resources Development Act of 1986 provided a revised nationwide policy with regard to flood control and coastal storm relief. Now after a disaster hits, Corps assistance could be initiated immediately by the Governor's request to FEMA for a damage assessment, and the Corps would work for a period of ten days completely federally-funded to help local areas get back to operational status. By the time the ten days are up, the declaration should be made concerning disaster status. The Corps would then either cease its assistance or take further directions from FEMA. Since this is a nationwide policy, Corps districts could be called upon to assist each other



*Aerial view of Tybee Island, Georgia showing the rip-rap and groin structures which were a part of emergency beach repairs conducted by the Corps of Engineers following severe weather damage. 1 July 1965. (Savannah District, Corps of Engineers)*



*View of the construction of a groin in the beach erosion control program on Tybee Island, Georgia. (Savannah District, Corps of Engineers)*



*Hurricane damage repair being conducted on Tybee Island, Georgia following Hurricane Dora in 1964. February 1965. (Savannah District, Corps of Engineers)*



*View down Beachview Drive on St. Simons Island, Georgia, after the passage of Hurricane Dora. Note the damaged wooden seawall to the right. September 1964. (Savannah District, Corps of Engineers)*



*Emergency repair work consisting of boulder rip-rap completed along Beachview Drive on St. Simons Island, Georgia, to protect the beach following the 1964 Hurricane Dora. January 1965. (Savannah District, Corps of Engineers)*




*Property damage on Sullivan Island off the coast of South Carolina caused by Hurricane Hugo in 1989. (Savannah District, Corps of Engineers)*

depending on the required manpower and expertise. In response to this new direction, the Savannah District emphasized pre-planning in order that work might begin within hours in an emergency situation.[39]

The pre-planning done by the District was tested in September 1989 when a killer hurricane, Hugo, made landfall in the Charleston, S.C. area. Savannah District Engineer, Col. Ralph V. Locurcio commented that the District was "as prepared as we could have been for this storm. We had sufficient warning, and our interface with local, state and federal agencies was superb."[40] The Savannah District and the Wilmington District assisted in the clean-up process, in the restoration of crucial dune systems, in the repositioning of important navigation markers in the harbor, in the repair and repositioning of a major bridge to outlying islands, and in many other capacities in the weeks following the disaster. This was truly a test of intra-Corps cooperation and logistics.

Since 1973 the Savannah District has been involved in a Water Resources Management Program in Georgia that is designed to assist state and local governments in planning the prudent use of their water resources. The Corps study was to address problems of water supply, wastewater management, water quality, flood control, recreation, fish and wildlife enhancement, bank and channel stabilization, and regional harbors and waterways. Authorized studies included the Metro-Atlanta Study, which began in 1973; the Metro-Savannah Study, which began in 1977; the Northeast Georgia Region Study, which was authorized in 1980; the South Metropolitan Atlanta Region Study, which began in 1983; the Metro-Macon Study, which began in 1978; the Brunswick Area Study, which was authorized in 1979; and the St. Marys River Basin Study which was authorized in 1982.

The water-supply plan for metropolitan Atlanta required that Lake Lanier and the Chattahoochee River provide 90 percent of the region's long-range water supply. The development of the long-range water supply from the Chattahoochee River was the major topic of the final report. In recommending the construction of a reregulation dam on the river 6.3 miles below Buford Dam and Lake Lanier, the report drew severe criticism from environmental groups. This plan, however, was considered to be the most feasible based on economic, environmental, and engineering considerations. Hence, it was adopted, and construction of the reregulation dam was endorsed by the State of Georgia, the Atlanta Regional Commission, the Georgia Mountains Area Planning and Development Commission, the U.S. Environmental Protection Agency (EPA), and the Southeastern Power Administration. The reregulation dam was authorized by the Water Resources Development Act of 1986 subject to approval of the Design Memorandum by the Secretary of the Army and the Governor of Georgia. The Design Memorandum was completed in October 1988. However, during the final stages of the Design Memorandum preparation, a reevaluation of hydropower costs and benefits along with rising real estate costs showed that a plan to reallocate storage in Lake Lanier from hydropower to water supply would provide greater net benefits than the reregulation dam. As a result, Supplement No. 1 to the Design Memorandum was prepared which recommended its implementation in place of the reregulation dam. After coordination with the Governor of Georgia, the state and local interests endorsed the reallocation plan, and a Post Authorization Change Report for the reallocation



*Aerial view of Jekyll Island, Georgia showing the strong littoral currents which have the tendency to erode the shoreline. St. Simons Sound and St. Simons Island can be seen in the distance at the top of the picture. 3 June 1966. (Savannah District, Corps of Engineers)*




*Map showing the area included in the Metro-Atlanta Water Resource Management Study begun in 1973. (Savannah District, Corps of Engineers)*

of storage in Lake Lanier for water supply was prepared for Congress.[41]

The Northeast Georgia Region Study covered 11 counties in northeast Georgia, the second-fastest-growing region in the State. As a result of this rapid growth, governments were hard pressed in planning and providing facilities to meet growing water needs. The District was to assist local agencies in dealing with future growth.

The purpose of the Northeast Georgia Region Water Resources Management Study was to develop comprehensive water resources management plans to the year 2030 for the involved counties. The studies included flood control and drainage, water supply, recreation, water quality control, fish and wildlife conservation, and other measures which contribute to improvements in national economic development and environmental quality for streams serving the area. The study was authorized in 1980 and funded in mid-1982 and completed in September 1987. The plans involved a regional water supply project and a number of smaller storage dams within the eleven-county region. The study would serve as a management tool for state and local officials to use in water resources planning efforts.[42]

The Curry Creek Dam and Lake project which was authorized by the Water Resources Development Act of 1974 was analyzed in the Northeast Georgia Study. It was concluded that construction of the Curry Creek project would not provide appreciable navigation benefits downstream and would not be a cost-effective method for reducing flood damages below the project dam site. As a result, it was recommended that Federal participation in construction of the Curry Creek Dam and Reservoir project was not warranted.[43]

The Northeast Georgia Region Water Resources Project was deauthorized in

December 1987 under the cost-sharing provisions of the Water Resources Development Act of 1986. Both the Georgia Department of Natural Resources and the U.S. Environmental Protection Agency, however, considered this a model for other water supply activities in the state.

The Metro-Savannah Study area initially related to Chatham, Bryan, and Effingham counties. In early 1981 the study area was expanded to include four South Carolina counties. The study addressed an urgent need for coordinated efforts in the development, use, and management of water and related resources. The study developed a comprehensive water management plan to provide alternative choices in the use of water and land resources. Areas of study included flood plain management, flood damage prevention, drainage, municipal and industrial water supply, water-quality control, water-based recreational opportunities, and fish and wildlife conservation. The study produced flood damage prevention plans, regional water-supply plans, and water-quality management plans. The final report was completed in December 1983.[43]

The Brunswick Area Water Resources Study was authorized by a resolution adopted by the House Public Works and Transportation Committee at the request of Congressman Bo Ginn on 9 May 1979. The study began in FY 82 and included the City of Brunswick and Glynn and Camden Counties (including Jekyll and St. Simons Islands and the Fleet Ballistic Missile Submarine Support Facility at Kings Bay). Reconnaissance investigations were also made in the adjoining counties of McIntosh, Wayne, Brantley, and Charlton. Major concerns included adequate fresh water supply, flood control and drainage, water quality, and emergency hurricane evacuation. A reconnaissance report was completed in July 1983 which showed the major problems to be associated with water supply. It focused on the Brunswick-Glynn County and Camden County areas and developed water supply alternatives including a groundwater management strategy.[44] The Final Report of the Brunswick area study was completed in August 1987 and found that a groundwater supply problem did exist in the area studied, particularly with respect to the heavy groundwater withdrawals in a small area of Brunswick. Due to the upward movement of saltwater from deep aquifers, the Georgia Environmental Protection Division became very reluctant to grant increases in groundwater withdrawal. Some positive movement toward the development of water conservation plans, as well as a plan to locate future industrial wells to the west of the area were noted as necessities.[45]

At the request of Congressman Newt Gingrich, the House Public Works and Transportation Committee adopted a resolution authorizing the South Metropolitan Atlanta Region Water Resources Study on 14 November 1979. The study began in September 1983. It addresses water resources problems in a nine-county region . The reconnaissance phase was completed in January 1985 and the feasibility phase was begun in November of the same year. A Report on Interim Regional Water Supply Alternatives which was completed in March 1987 outlined eight regional alternatives that would meet the study area water demand projections to the year 2030. The final report was to be completed in September 1989 and would assist local water managers and state officials in developing a long-range regional water management plan for the development, utilization, and conservation of water and related resources.[46]

The Metropolitan Macon Water Resources Management Study was authorized by a resolution adopted 15 March 1988 by the House Committee on Public Works and Transportation. Previously, the study had been authorized by resolutions adopted by the Senate Committee on Environment and Public Works dated 3 March 1978 and the House Committee on Public Works and Transportation dated 25 April 1978. It had been deauthorized in December 1987 under the cost-sharing provisions of the Water Resources Development Act of 1986. A Reconnaissance Study was planned for completion in 1989. Study area boundaries included Bibb and Houston Counties and the surrounding counties of Monroe, Jones, Twiggs, Peach, and Crawford. Preliminary discussions with local interests indicated that flood control and drainage, water supply, and water quality were the major concerns.[47]

The St. Marys River Basin Study was authorized by a resolution of the House Committee on Public Works and Transportation adopted 23 September 1982. The St. Marys River rises in the Okefenokee Swamp in Charlton and Ware Counties, Georgia and flows generally eastward for some 125 miles, forming part of the boundary between Florida and Georgia. It empties into the Atlantic Ocean through Cumberland Sound. The St. Johns River Water Management District in Florida was the primary sponsor of the study. Its main concern was for the development of flood plain information along the St. Marys River and several of its tributaries. Development of the Navy's Kings Bay Submarine Support Base and the normal growth in the area due to the proximity of the City of Jacksonville have increased development pressures. Because of this growth, local officials recognized the need for future planning, zoning, and management of the basin's land and water resources.[48]

Feasibility studies were initiated based on the findings of the reconnaissance studies in February 1985. Cost sharing was implemented in March 1986 and FY 88 funds were used to complete hydrology and hydraulic studies, prepare flood profiles, and prepare the final report. The final report was submitted September 1988 recommending no further action through this authorization.[49]

In 1972 Congress enacted Public Law 92-376, which authorized the U.S. Army Corps of Engineers to inventory and inspect designated dams within the United States.[50] Following the collapse of the Kelly-Barnes Dam at Toccoa, Georgia, in November 1977, and the subsequent loss of lives, President Jimmy Carter directed the Secretary of the Army, Howard "Bo" Callaway, to begin inspecting nonfederal dams that might have a high potential for future loss of life and property. The Savannah District began this inspection program in Georgia in December 1977. As expected, a high percentage of the dams inspected by Corps personnel or architect-engineer firms under contract with the District were found unsafe. These dams were inspected based on a priority dictated by the State, using Corps' data and other information on hazardous structures.[51]

Safety hazards varied from inadequate spillway capacity (a common problem with small private dams) to poor or nonexistent maintenance and faulty design. A number of impoundments were ordered drained and in some instances the dams themselves were breached to prevent refilling until remedial action could be taken. As the inspection program progressed, the District contracted with architect-engineer firms to complete on-site surveys and reports. These reports

then were reviewed by a District multi-disciplinary panel of engineers using the Chief of Engineers' Guidelines for Inspection of Dams.

The Georgia legislature passed a Dam Safety Act on 1 July 1978, which required an inspection of all dams over 25 feet high or impounding more than 50 acre-feet of water. Dams with a life-threatening potential (those in areas with downstream populations) must receive State permits, and the State had the power to order improvements or to compel owners to drain their impoundments.[52]

The Savannah District was allotted $536,400 for the Dam Safety Program in Georgia during FY 81. This enabled the District, using architect-engineer firms and in-house personnel, and in cooperation with the State, to inspect 97 nonfederal dams and 13 dams located on military installations. The District also completed updating the inventory of 3,299 dams in the State. The State of Georgia assumed responsibility for this program in late 1981.[53]

In compliance with numerous legislative authorizations and court decisions, the Corps of Engineers issues permits for structures or work in navigable waters of the United States and for the discharge of dredged or fill materials in waters of the United States. Until the 1960s the Savannah District, as did most other Districts, interpreted this regulatory responsibility to apply "to waters which are presently used, were used in the past, or could be used by reasonable improvements to transport interstate commerce."[54] Two developments dramatically transformed this interpretation between 1967 and 1972: one was major environmental legislation at the Federal level and the other was the case of the American Cyanamid Company's operations in the Savannah Harbor.[55]

In 1956 the American Cyanamid Company opened a large factory in Savannah to produce titanium dioxide, a material used to whiten paints, plastics, paper, and other substances. In the process of synthesizing the titanium dioxide, the factory "began pouring a niagara of waste sulfuric acid, iron sulfates, and assorted heavy metals into the Savannah River."[56] By the early 1970s the Savannah plant accounted for approximately 10 percent of the titanium dioxide produced in the United States. In responding to the waste problem, the State of Georgia ordered the company to find another method for disposing of these waste materials. Cyanamid decided that the only feasible alternative was to start dumping the waste into the Atlantic Ocean. This method, however, required expanded docking facilities at the Savannah River plant so that the effluent could be barged beyond the U.S. territorial limits into the Atlantic. At the end of 1971 the company applied to the Savannah District for a permit to construct the new docking facilities.[57] Not surprisingly, this proposal became an environmental issue of national significance.

The Corps of Engineers' authority over construction projects in the navigable waters of the United States dates back to the Rivers and Harbors Act of 1899. This act, however, was designed primarily to protect commercial shipping from dangerous obstacles. A series of Supreme Court decisions in the 1930s and 1940s encouraged those who were arguing for a broader exercise of power by the Corps. This initiative was strengthened further by the broad environmental legislation during the 1960s. One study concludes, however, that "it is unlikely that any of these developments would have had a substantive effect on the Corps' reaction to Cyanamid's ocean dumping plan if it had been proposed in 1967 or 1968."[58]



*The Corps of Engineers exercises authority to control development along the nation's waterways through its Regulatory Permit Program. (Savannah District, Corps of Engineers)*

When President Nixon signed the National Environmental Policy Act in 1970, environmental protection was explicitly added to the decision-making criteria of every Federal agency. The Corps now was required to examine all projects in the broadest environmental terms. In the case of the American Cyanamid Company's proposed docking facilities, the Corps considered not only the direct effects of the dock but also the purpose for which the dock was being built. The new act also required Federal agencies to exchange information on any decision that was likely to have a significant effect on the environment.



*View of a typical salt-water marsh which is part of the wetlands area regulated by the Corps of Engineers under recent legislative authorization and court decisions. November 1978. (Savannah District, Corps of Engineers)*

On 14 December 1971, following instructions from his superiors, Colonel Howard L. Strohecker, Chief Savannah District Engineer, announced a public hearing for 18 January 1972 in Savannah's Federal Court Building.[59] This notice was published in newspapers, and copies were sent to public officials, private organizations, environmental groups, and individuals as well as to other Federal agencies. Colonel Strohecker told those attending the hearing that "a different method of processing [the Cyanamid permit for dock construction] is required because of the intense controversy which has come to my attention on this matter."[60] He indicated that the information received from the participants at the hearing would be considered carefully in reaching a final decision on the proposal.

After the hearing the Savannah District had to decide whether to prepare an Environmental Impact Statement (EIS). Colonel Strohecker recommended against issuing an EIS; he understood that Corps regulations did not require such a statement in the case of deep ocean dumping. Instead, he ordered the preparation of an "environmental assessment," which was similar to an EIS but did not have to be circulated to other agencies for comment. Corps of Engineers headquarters responded somewhat equivocally to Colonel Strohecker's recommendation. This left the decision on the permit in the hands of the Savannah District Engineer. In June 1972, Colonel Strohecker approved the Cyanamid permit for a period of three years. The Washington office then stated: "It is our opinion that an environmental impact statement is required to be prepared and circulated to the full extent contemplated under NEPA in order to fully explain the ramifications which would result from the issue of such a permit."[61] This order changed the direction of the Savannah District's permit program.

The District circulated a draft EIS in late 1972, collected and assimilated all comments and all available research data, and in March 1973 sent a final environmental impact statement to Corps headquarters in Washington. On 14 November 1973 the Savannah District announced that it was denying the Cyanamid request for a dock permit but would consider a subsequent application if the company first secured permission from the newly formed EPA to proceed with its ocean dumping operation. As a result of this announcement, Cyanamid decided to construct a new plant that would convert its waste effluent into a marketable gypsum byproduct, thus sparing both the Savannah River and the Atlantic Ocean.

Another controversy concerning the Corps' authority to issue permits came in the 1980s in connection with a proposal from Alma, Georgia and Bacon County officials to build a 1,400 acre recreational lake in that area. The lake was a part of a community development program which the citizens of Alma began under the Model Cities program in 1968. Controversy among landowners whose property would be impacted, environmentalists who feared that the natural habitat would be disasterously altered, and the local officials who insisted that the economic benefits to the area would be tremendously erupted almost from the beginning of the project. The Corps became involved in 1981 when it issued a permit for the project following the approval of the U.S. EPA. A subsequent lawsuit halted the project for a number of years, and the Corps was finally ordered by the court to perform an update of the earlier EIS. The Final Environmental Impact Statement was completed in 1987, but by that time the U.S. EPA, under a new administration, rejected the Statement and threatened to invoke its little-used veto power if the Corps issued another permit. On 27 May 1988, the Corps announced its intention to approve the project application for a permit, and once again the Lake Alma project became stalled in institutional procedures.[62]

After the passage of NEPA, the creation of EPA, and the Cyanamid case, the policy of the Savannah District in processing permits was to weigh heavily the interests of the State and to cooperate whenever possible with State agencies in issuing permits. To this end, several regional general permits have been issued and joint processing procedures have been established. For instance, the District had an agreement with the Georgia Department of Natural Resources whereby joint state-Corps applications are submitted and joint public notices are issued on applications received. The Savannah and Charleston Districts have shared regulatory jurisdiction in the Savannah River Basin, and the Savannah and Mobile Districts have shared jurisdiction over a large portion of the Chattahoochee River Basin. The Savannah District has handled regulatory actions in Georgia that do not affect Mobile District's civil works projects. If either Charleston or Savannah permit actions would affect civil works projects, appropriate Districts have coordinated consideration of any actions taken.

During FY 83, the Savannah District began a contract inspection program for some regulatory activities in the 6 coastal counties of Georgia.[63] This program proved very successful, and increasing numbers of inspections were contracted. This enabled the Corps to respond quickly to public concerns and to improve the review process for permit applications. It also allowed better monitoring



*Savannah District's Drill Team tests for hazardous waste. (Savannah District, Corps of Engineers)*

and inspection of work in progress.

The District constantly has sought activities to add to the General Permit Program. As of 1984, 15 general permits authorized activities such as the construction of private, noncommercial, single-family docks in the coastal counties; placement of riprap and construction of bulkheads on Hartwell and Clark Hill lakes; and construction of aerial power lines crossing Hartwell, Clark Hill, and Richard B. Russell lakes. A State General Permit Program has governed the discharge of fill materials associated with the mining of clay, and a Regional Permit Program has authorized activities approved by the Crisp County Power Commission on Lake Blackshear. This program of establishing state and regional permits for specified works has been ongoing and constantly reevaluated through public input.[64]

National environmental concerns brought yet another expansion to the Corps' activities in the late 1980s. When Congress allocated money for investigation of previous Department of Defense sites in order to test for hazardous materials, the Corps of Engineers was given the mission with the Defense Environmental Restoration Program (DERP) to conduct the investigations. Each district is generally responsible for old inactive sites within its borders even though the sites may have become the property of counties, municipalities, or private individuals. In many cases, chemical contamination at the deactivated defense installations was the result of certain World War II operational practices.[65] An example of this activity came in March 1989 when leaking underground storage tanks were discovered in an area that was once Glynco Army Airfield near Brunswick, Georgia. Through DERP funding, the removal of these tanks was contracted out to a Jacksonville, Florida firm which had

considerable experience in the field of hazardous and toxic waste clean-up.[66] The Savannah District began to seek more work in this area since the traditional civil works function was decreasing.[67]

The numerous and varied programs that have characterized the work of the Savannah District since 1970 illustrate the ability of the Corps of Engineers to change the direction of its mission according to the needs and concerns of changing times. Since its beginning in 1829, the work of the Savannah District Corps of Engineers has demonstrated this quality. Born of the need to provide adequate coastal defenses for a young nation, the activities of the District have gone through varying periods of emphasis. These have included developing major navigation projects in the primary rivers and harbors of Georgia; responding to the challenges of advancing military technology in times of both war and peace; planning to meet the nation's needs for hydroelectric power, flood control, and recreation; and preserving and enhancing the environment through programs designed to improve the quality of life for the general public. In all of these areas, the men and women of the Savannah District have performed admirably. The most enduring quality of this organization has been its ability to change in response to national demands while remaining constant in its commitment to excellence.

# APPENDIX A

## SUPERINTENDING ENGINEERS — SAVANNAH STATION AND DISTRICT ENGINEERS — SAVANNAH DISTRICT*

| Name | From | | To | |
|---|---|---|---|---|
| *SUPERINTENDING ENGINEERS:* | | | | |
| Maj. Samuel Babcock | | 1828 | | 1830 |
| (Lt. Robert E. Lee, Assistant Engineer) | | (1829) | | (1831) |
| Lt. (later Capt.) Joseph King Fenno Mansfield | | 1830 | | 1839 |
| *TOPOGRAPHICAL BUREAU (CIVIL WORKS ONLY):* | | | | |
| Capt. John Mackay | | 1839 | | 1846 |
| Lt. Martin Luther Smith | | 1847 | | 1852 |
| *CORPS OF ENGINEERS (MILITARY CONSTRUCTION ONLY):* | | | | |
| *Capt. Joseph King Fenno Mansfield* | | *1839* | | *1846* |
| *Lt. Barton S. Alexander* | | *1846* | | *1848* |
| *Lt. Jeremy Francis Gilmer* | | *1848* | | *1852* |
| *SUPERINTENDING ENGINEERS:* | | | | |
| Lt. (later Capt.) Jeremy Francis Gilmer | | 1852 | | 1858 |
| Lt. William Henry Chase Whiting | | 1858 | | 1861 |
| Maj. (later Lt. Col. and Col.) Quincy A. Gillmore | 19 Nov. | 1869 | 7 Apr. | 1888 |
| Col. Henry L. Abbot (Acting) | 6 Apr. | 1888 | 24 Apr. | 1888 |
| *DISTRICT ENGINEERS:* | | | | |
| Lt. (later Capt.) Oberlin M. Carter | 24 Apr. | 1888 | 20 July | 1897 |
| Maj. (later Lt. Col. and Col.) Quincy A. Gillmore | | 1871 | 6 Apr. | 1888 |
| Col. Henry L. Abbot (Acting) | 6 Apr. | 1888 | 24 Apr. | 1888 |
| Lt. (later Capt.) Oberlin M. Carter | 24 Apr. | 1888 | 20 July | 1897 |
| Capt. Cassius E. Gillette | 20 July | 1897 | 29 Apr. | 1903 |
| Col. James B. Quinn | 29 Apr. | 1903 | 1 Feb. | 1906 |
| Capt. Cassius E. Gillette (Acting) | 1 Feb. | 1906 | 2 Mar. | 1906 |
| Col. Dan C. Kingman | 15 Mar. | 1906 | 9 Oct. | 1913 |
| Maj. George P. Howell | 9 Oct. | 1913 | 7 Jan. | 1914 |
| Col. William C. Langfitt | 7 Jan. | 1914 | 20 June | 1914 |
| Col. John Biddle (Temp. relief) | 20 June | 1914 | 2 Sept. | 1914 |
| Col. William C. Langfitt | 2 Sept. | 1914 | 27 June | 1916 |
| Maj. Gilbert A. Youngberg (Acting) | 27 June | 1916 | 27 July | 1916 |
| Col. John Millis | 27 July | 1916 | 9 Nov. | 1918 |
| Col. Frederick W. Altstaetter | 9 Nov. | 1918 | 18 Sept. | 1923 |
| Maj. Dan I. Sultan | 18 Sept. | 1923 | 31 July | 1925 |
| Maj. William F. Tompkins | 1 Aug | 1925 | 20 July | 1928 |

| | | | | |
|---|---|---|---|---|
| Maj. Douglas L. Weart | 21 July | 1928 | 31 Aug. | 1932 |
| Maj. (later Col.) Creswell Garlington | 1 Sept. | 1932 | 13 July | 1936 |
| Lt. Col. Raymond F. Fowler | 13 July | 1936 | 13 June | 1940 |
| Lt. J.A. Smedile (Acting) | 14 June | 1940 | 4 July | 1940 |
| Maj. Girard B. Troland | 5 July | 1940 | 6 Nov. | 1940 |
| Col. Frederick W. Altstaetter | 7 Nov. | 1940 | 14 Dec. | 1941 |
| Maj. (later Col.) Peter A. Feringa (Maj. Feringa actually assumed duties 20 Jan. 1942) | 15 Dec. | 1941 | 14 Sept. | 1943 |
| Lt. Col. E.L. Beriswell | 15 Sept. | 1943 | 14 Jan. | 1944 |
| Maj. Huguenin Thomas, Jr. (Acting) | 15 Jan. | 1944 | 5 June | 1944 |
| Lt. Col. Huguenin Thomas, Jr. | 6 June | 1944 | 8 Sept. | 1944 |
| Col. Clifford T. Hunt | 9 Sept. | 1944 | 8 Aug. | 1945 |
| Lt. Col. John P. Larsen (Acting) | 9 Aug. | 1945 | 6 Sept. | 1945 |
| Col. Wilson B. Higgins | 7 Sept. | 1945 | 26 June | 1946 |
| Col. Paschal N. Strong, Jr. | 27 June | 1946 | 8 Apr. | 1949 |
| Maj. William H. McKenzie III (Acting) | 9 Apr. | 1949 | 10 July | 1949 |
| Col. Robert Erlenkotter | 11 July | 1949 | 30 Oct. | 1952 |
| Col. Ellis E. Wilhoyt, Jr. | 1 Nov. | 1952 | 11 July | 1954 |
| Col. Thomas DeF. Rogers | 12 July | 1954 | 4 Dec. | 1956 |
| Col. Robert C. Bahr | 5 Dec. | 1956 | 10 July | 1959 |
| Col. Wilbur A. Stevens | 11 July | 1959 | 28 Feb. | 1962 |
| Lt. Col. Arthur T. Strickland (Acting) | 1 Mar. | 1962 | 10 July | 1962 |
| Col. Jack R. Harris | 11 July | 1962 | 31 Aug. | 1963 |
| Col. Paul W. Ramee | 1 Sept. | 1963 | 13 Feb. | 1966 |
| Col. William L. Barnes | 14 Feb. | 1966 | 25 Oct. | 1968 |
| Col. John S. Egbert | 28 Oct. | 1968 | 19 Oct. | 1970 |
| Col. Howard L. Strohecker | 21 Oct. | 1970 | 29 June | 1973 |
| Col. Edwin C. Keiser | 16 July | 1973 | 30 Apr. | 1976 |
| Col. Frank Walter | 3 May | 1976 | 31 May | 1978 |
| Col. Tilford C. Creel | 19 June | 1978 | 15 July | 1981 |
| Col. Charles E. Dominy | 15 July | 1981 | 30 Dec. | 1983 |
| Col. Daniel W. Christman | 30 Dec. | 1983 | 30 Jan. | 1986 |
| Col. Stanley G. Genega | 30 Jan. | 1986 | 14 June | 1988 |
| Col. Ralph V. Locurcio | 14 June | 1988 | Present | |

*Cullom, *Biographic Register:* District Engineer Chart, Installation Historical Files.

## APPENDIX B

## GALLERY OF DISTINGUISHED CIVILIAN EMPLOYEES

1. Morton V.B. Haas
   Senior Engineer
   Operations & Construction Division
   1919-1939
2. Ralph F. Rhodes
   Chief, Civil Works Engineering Division
   1921-1949
3. Floyd H. Elsom
   Assistant Chief, Engineering Division
   1946-1964
4. Edwin S. Epstein, Jr.
   Lock Master
   New Savannah Bluff
   Lock and Dam
   16 Dec 1936 - 06 Jun 1965
5. Mary L. Granger
   Technical Publications Writer-Editor
   Engineering Division
   1943-1967
6. Charles F. Trainor
   Chief, Engineering Division
   1947-1968
7. Maggie D. Everett
   Chief, Employment & Services Branch
   Personnel Office
   1941-1969
8. Fred W. Facey, Jr.
   Chief, Construction Division
   1934-1969
9. Ben H. Cunningham
   Chief, Relocations Branch
   Engineering Division
   1940-1970
10. William J. Crump
    Chief, Office of
    Administrative Services
    1940-1972
11. Hayden H. Banks, Jr.
    Chief, Emergency
    Operations Division
    1941-1973
12. Louis R. Hagood, Jr.
    Assistant Chief,
    Engineering Division
    1942-1974
13. John W. Harris
    Chief, Navigation
    Section
    1949-1974
14. Frances F. Mitchell
    Administrative Aid
    Executive Office
    1942-1974
15. Joseph F. Frewer
    Chief, Operations
    Division
    1931-1976
16. Maurine L. George
    Budget Officer
    Office of the
    Comptroller
    1947-1979
17. William Kelley Mims
    Chief, Real Estate
    Division
    1942-1980
18. Wilber L. Shealy
    Chief, Construction
    Division
    1951-1980
19. John L. Leroy
    Natural Resources Manager
    Operations Division
    1953-1983
20. Julia M. Murphey
    Chief, Technical Services
    Branch Personnel Office
    1941-1983
21. Leroy C. Fowler
    District Council
    Office of Council
    1957-1987

# NOTES

## Chapter I

1. Harold H. Martin, *Georgia, A Bicentennial History* (New York: W.W. Norton and Co., 1977), p. 3.
2. Ibid.
3. David H. Corkran, *The Creek Frontier, 1540-1783* (Norman, OK: University of Oklahoma Press, 1967), p. 3.
4. Ibid., p. 5; R.S. Cotterill, *The Southern Indians: The Story of the Civilized Tribes Before Removal* (Norman, OK: University of Oklahoma Press, 1954), p. 9.
5. James Adair, *The History of the American Indians* (London, 1775), p. 275, as quoted in Corkran, *The Creek Frontier,* p. 5.
6. Cotterill, *The Southern Indians,* p. 9.
7. Ibid., p. 14.
8. Ibid., p. 15.
9. Hidalgo de Elvas, *True Relation of the Hardships Suffered by Hernando de Soto,* trans. James A. Robertson, 2 vols. (Deland, FL: Florida State Historical Society, 1933), 2:5-313, cited in Martin, *Georgia, A Bicentennial History,* p. 5.
10. William B. Stevens, *A History of Georgia,* reprint of 1847 edition (Savannah, GA: The Beehive Press, 1972), pp. 8-26.
11. Herbert E. Bolton and Mary Ross, *The Debatable Land* (New York: Russell and Russell, 1925), p. 5.
12. Corkran, *The Creek Frontier,* p. 49.
13. Quoted in William Harden, *A History of Savannah and South Georgia,* 2 vols. (Atlanta, GA: Cherokee Publishing Co., 1969), 1:12.
14. Kenneth Coleman, ed., *A History of Georgia* (Athens, GA: University of Georgia Press, 1977), p. 19.
15. Georgia Historical Society, *Collections of the Georgia Historical Society,* multiple vols. (Savannah, GA: 1840-), 1:83-84, 91.
16. The war between Spain and England from 1739 to 1748 has come to be known as "The War of Jenkins' Ear," from an incident that occurred in the Caribbean Sea eight years earlier. Robert Jenkins, a British ship captain, was caught smuggling by a Spanish coast guard. In order to impress on the Englishman the seriousness of his error, the Spanish naval officer reportedly cut off one of Jenkins' ears and remarked that he would do the same to the King of England if he had the opportunity. This incendiary event was used later to arouse the emotions of Parliament in support of war.
17. Bolton and Ross, *The Debatable Land,* p. 19.
18. Coleman, *A History of Georgia,* p. 51.
19. Ibid.
20. Ibid.
21. *American State Papers: Miscellaneous,* 38 vols. (Washington, DC: Gales and Seaton, 1832-1861), 1:724-741.
22. James D. Richardson, ed., *A Compilation of the Messages and Papers of the Presidents,* 10 vols. (Washington, DC: U.S. Government Printing Office, 1896-1899), 1:215-216.
23. U.S., *Statutes at Large,* 2:173, hereafter cited as *Stats. at L.*
24. Charles Francis Adams, ed., *Memoirs of John Quincy Adams,* 12 vols. (Philadelphia, PA: Howes, 1874), 1:460.
25. Richardson, *Messages and Papers,* 2:18.
26. Until about the time of the Civil War, cannon fired only solid, spherical iron balls, and their caliber was expressed in terms of the weight of the ball.

27. *American State Papers: Military Affairs,* 7 vols. (Washington, DC: Gales and Seaton, 1832-1861), 1:62-63, hereafter cited as *ASP: MA;* Emanuel R. Lewis, *Seacoast Fortifications of the United States, An Introductory History,* Paperback edition (Annapolis, MD: Leeward Publications, 1970), p. 17.
28. *ASP: MA,* 1:61-64; Lewis, *Seacoast Fortifications,* p. 21.
29. *Stats. at L.,* 1:345-346; Lewis, *Seacoast Fortifications,* p. 21.
30. *ASP: MA,* 1:71-107; Lewis, *Seacoast Fortifications,* p. 21. Lewis distinguishes between eight stages, which he refers to as "generations." For purposes of the immediate study, only the first three will be considered.
31. Lewis, *Seacoast Fortifications,* p. 22.
32. Ibid., p. 25; *ASP: MA,* 1:219-222; *Stats. at L.,* 2:453, 516, 547, 661, 692.
33. Lewis, *Seacoast Fortifications,* p. 25.
34. Ibid., p. 31.
35. Ibid., pp. 36-37; *ASP: MA,* 2:305.
36. Lewis, *Seacoast Fortifications,* p. 42.
37. Ibid., pp. 42-53.
38. Ibid., p. 67.
39. Henry P. Beers, "A History of the U.S. Topographical Engineers, 1813-1863," *The Military Engineer* 34 (June-July 1942):291; *Stats. at L.,* 5:257.
40. U.S., Congress, Senate, Doc. No. 55, 26th Cong., 1st sess., pp. 11-12. Congressional documents will hereafter be cited as S. Doc. or H. Doc.
41. Beers, "Topographical Engineers," p. 348.
42. *Stats. at L.,* 12:743.
43. Ulrich B. Phillips, *Life and Labor in the Old South* (Boston, MA: Little, Brown and Co., 1929), p. 3.
44. Ulrich B. Phillips, *A History of Transportation in the Eastern Cotton Belt to 1860* (New York: Columbia University Press, 1908), p. 21.
45. Ibid., p. 52.
46. *South Carolina Gazette* as quoted in *Niles Weekly Register* 15 (Oct. 1818):135.
47. Judson C. Ward, "Internal Improvements in Georgia, 1817-1843" (M.A. thesis, Emory University, 1934), p. 11.
48. Ibid., p. 12.
49. *Georgia Messenger,* 21 Nov. 1826.
50. *Southern Recorder,* 18 Nov. 1823.
51. Milton Sydney Heath, *Constructive Liberalism: The Role of the State in Economic Development in Georgia to 1860* (Cambridge, MA: Harvard University Press, 1954), pp. 233-234.
52. Ibid., pp. 235-236.
53. Ibid., p. 236.
54. *Niles Weekly Register,* 11 (Dec. 1816):295-296.
55. *Niles Weekly Register,* 13 (Nov. 1817):218.
56. Ibid.
57. Lucius Q.C. Lamar, ed., and comp., *A Compilation of the Laws of the State of Georgia, 1810-1819* (Augusta, GA: T.S. Hanson, 1821), pp. 513-515.
58. Ibid., pp. 274-275.
59. *Southern Recorder,* 21 Nov. 1820.
60. *Georgia Messenger,* 29 Mar. 1826.
61. Ward, "Internal Improvements," pp. 58-68; *Acts of the General Assembly of the State of Georgia, 1820-1840* (Milledgeville, GA: State Printing Office, 1820-1840), 1826:42.
62. *Georgia Messenger,* 28 Nov. 1826.
63. *Acts of the General Assembly of the State of Georgia,* 1828:220.

64. Ibid., 1833:305-308.
65. Ward, "Internal Improvements," pp. 32-33; *Georgia Patriot,* 15 Mar. 1835, 5 Apr. 1825, 10 May 1825, 24 May 1825, 5 June 1825.
66. Phillips, *History of Transportation,* p. 107.
67. Simonne Annette Cowart Burdges, "Georgia's Attempts at Internal Improvements: A Survey of the River Commissioners' Reports, 1817-1840" (M.A. thesis, Georgia State University, 1970), p. 50.
68. *Journal of the Senate of the State of Georgia* (1821), p. 36; *Journal of the House of Representatives of the State of Georgia* (1821), pp. 30, 156.
69. *Acts of the General Assembly of the State of Georgia,* 1825:111-113.
70. Ibid., 1826:42.
71. William C. Dawson, ed., *A Compilation of the Laws of the State of Georgia, 1819-1829* (Milledgeville, GA: Grantland and Orme, 1831), pp. 355-357.
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74. Ibid., pp. 66-67.
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79. Ibid., pp. 116-117.
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84. Jones, *The Dead Towns of Georgia,* pp. 181-182.
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87. Hugh McCall, *The History of Georgia, Containing Brief Sketches of the Most Remarkable Events up to the Present Day,* 2 vols. (Savannah, GA: Seymour and Williams, 1811-1816), 1:324.
88. Forts Committee, Georgia Department of Archives and History, "Georgia Forts: Fort McIntosh," *Georgia Magazine,* Aug.-Sept. 1969, p. 22.
89. McCall, *The History of Georgia,* 1:326; Charles C. Jones, Jr., *The History of Georgia,* 2 vols. (Boston, MA: Houghton Mifflin and Co., 1883), 2:260.
90. Forts Committee, "Fort McIntosh," p. 23.
91. Quoted in Harden, *A History of Savannah,* 1:275.
92. Mary L. Granger to Col. Paschal Strong, n.d., U.S. Army, Corps of Engineers, Savannah District, Installation Historical Files, Box 1483. Hereafter cited as Installation Historical Files.
93. *Columbian Museum and Advertiser,* 15 Jan. 1808.
94. Quoted in Granger to Strong, n.d., Installation Historical Files, Box 1483.
95. Quoted in Harden, *A History of Savannah,* 1:276.
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97. Quoted in Alston C. Waylor, "Georgia Forts: Fort Jackson," *Georgia Magazine,* Oct.-Nov. 1968, p. 17.
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**Chapter II**

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2. Alexander Macomb to Samuel Babcock, 16 Nov. 1824, Washington, DC, National Archives, Record Group 77, Entry 249. National Archives, Record Group hereafter cited as NA, RG.
3. Alexander Macomb to Samuel Babcock, 14 June 1825, NA, RG 77, Entry 249.
4. "Babcock Case," NA, RG 153.
5. Charles Gratiot to Samuel Babcock, 18 Dec. 1830, NA, RG 77, Entry 6.
6. Charles Gratiot to Joseph Mansfield, 18 Dec. 1830, NA, RG 77, Entry 6.
7. George Washington Cullum, *Biographical Register of the Officers and Graduates of the U.S. Military Academy at West Point, N.Y. from Its Establishment in 1802 to 1890,* 9 vols., 3d ed. (Boston, MA: Houghton Mifflin and Co., 1891), 1:277.
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9. Ezra J. Warner, *Generals in Gray: Lives of the Confederate Commanders* (Baton Rouge, LA: Louisiana State University, 1959), p. 105.
10. Ibid.
11. Engineer Order No. 8, 1829, as quoted in an unpublished speech draft by Mary L. Granger, 4 Jan. 1950, Installation Historical Files.
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13. Warner, *Generals in Gray,* pp. 334-335.
14. *Laws of the United States Relating to the Improvement of Rivers and Harbors,* 3 vols. and index, H. Doc. 1491, 62d Cong., 3d sess.; and H. Doc. 379, 76th Cong., 1st sess (Washington, DC: Government Printing Office, 1913, 1940), 1:33, hereafter cited as *Laws Relating to the Improvement of Rivers and Harbors; Stats. at L.,* 4:173.
15. Documents pertaining to the 1827-1830 work done under the direction of the Treasury Department are found in H. Doc. 104, 21st Cong., 1st sess.; and in H. Doc. 106, 21st Cong., 2d sess.
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17. Ibid.
18. Annual Report, John Mackay to Charles Gratiot, 30 Sept. 1837, letters received by the War Department, NA, RG 77, Entry 18, Item M1970.
19. Ibid.
20. Charles Gratiot to Joseph Mansfield, 11 June 1835, NA, RG 77, Entry 6.
21. See S. Doc. 100, 26th Cong., 1st sess.
22. *Stats. at L.,* 10:640; *Laws Relating to the Improvement of Rivers and Harbors,* 1:129.
23. See S. Exec. Doc. 16, 34th Cong., 1st sess.
24. *Stats. at L.,* 11:30; *Laws Relating to the Improvement of Rivers and Harbors,* 1:134.
25. William Whiting to Engineer Department, 19 Feb. 1860, letters received by the War Department, NA, RG 77, Entry 18, Item W2423.
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34. Joseph Mansfield to Chief of Engineers, 23 Jan. 1831, NA, RG 77, Entry 18, Item M741.
35. Joseph Mansfield to Chief of Engineers, 30 Sept. 1831, NA, RG 77, Entry 18, Item M851; Joseph Mansfield to Chief of Engineers, 2 Oct. 1831, NA, RG 77, Entry 18, Item M852.
36. Barton Alexander to Chief of Engineers, 13 Apr. 1847, NA, RG 77, Entry 18, Item A653.
37. Rogers W. Young, "The Construction of Fort Pulaski," *Georgia Historical Quarterly* 20 (Mar. 1936):51.
38. *Stats. at L.*, 5:744; *Laws Relating to the Improvement of Rivers and Harbors*, 1:108; Joseph Mansfield to Chief of Engineers, 6 June 1845, NA, RG 77, Entry 18, Item M1479.
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40. *Stats. at L.*, 9:67.
41. U.S. Army, Corps of Engineers, *Annual Report of the Chief of Engineers, 1850* (Washington, DC: 1850), p. 19. Hereafter cited as *Annual Report*.
42. *Annual Report, 1857*, pp. 180-181.
43. *Annual Report, 1857*, p. 181; *Annual Report, 1858*, pp. 823-824; *Annual Report, 1861*, p. 102.
44. William Whiting to Chief of Engineers, 23 Jan. 1861, NA, RG 77, Entry 18, Item W2529; William Whiting to Chief of Engineers, 29 Jan. 1861, NA, RG 77, Entry 18, Item W2531.
45. Charles H. Olmstead, "Fort Pulaski," *Georgia Historical Quarterly* 1 (1917):102.
46. Ibid., p. 103.
47. Ibid.
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**Chapter III**

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2. I.Y. Schermerhorn, "The Rise and Progress of River and Harbor Improvement in the United States," *Journal of the Franklin Institute* 139 (1895):260.
3. Ibid., pp. 261-262.
4. William Stull Holt, *The Office of the Chief of Engineers of the Army: Its Nonmilitary Historical Activities and Organization* (Baltimore, MD: Johns Hopkins University, 1923), p. 21.
5. John R. Ferrell, "From Single- to Multi-Purpose Planning: The Role of the Army Engineers in River Development Policy, 1824-1930," draft manuscript (Baltimore,

MD: Historical Division, OCE, Feb. 1976), pp. 190, 192.

6. Leahmae Brown, "The Development of National Policy with Respect to Water Resources" (abstract, Ph.D. dissertation, University of Illinois, 1937), p. 6.
7. Ferrell, "From Single- to Multi-Purpose Planning," p. 192.
8. House Subcommittee of the Committee on the Judiciary, 69th Cong., 1st sess., Hearing on H.R. 8902, pp. 1-12, cited in Lenore Fine and Jesse A. Remington, *The Corps of Engineers: Construction in the United States, United States Army in World War II; The Technical Services* (Washington, DC: Department of the Army, Office of the Chief of Military History, 1972), p. 62.
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10. Cullum, *Biographical Register,* 1:369; Mary L. Granger, *History of the Savannah District, 1829-1968* (Savannah, GA: U.S. Army Engineer District, 1968), pp. ii, 14.
11. See *Annual Report, 1886,* pp. 176, 1073, 1094; and *Annual Report, 1888,* pp. 135, 138, 1005.
12. *Annual Report, 1889,* p. 16.
13. Cullum, *Biographical Register,* 1:369-370.
14. "Letters Received, Fortification Division, 1870-1886," NA, RG 77, Entry 64; "Letters Received Relating to Fortifications, 1886-1887," NA, RG 77, Entry 76.
15. Carter's annual report for 1890 is an excellent example of the professionalism he brought to his work.
16. Carter's 1890 report on the Savannah River was so scientifically accurate and detailed that it was followed with only slight modifications as the primary project for improving that river and harbor system. To control floodwaters in the Augusta, Georgia, area Carter recommended impoundment of the waters of the Savannah River and its tributaries above Augusta through a system of dams, a project that was not put into operation until the mid-20th century.
17. Granger, *History of the Savannah District,* p. 16.
18. *New York Times,* 6 Oct. 1898, p. 5-1.
19. Granger, *History of the Savannah District,* p. 16; see also O.M. Carter, "The Essential Facts Concerning My Unjust Condemnation and Subsequent Vindication Compiled from Official Sources" (July 1908), NA, RG 77, Entry 103, file 22530/395; and Casper W. Ooms, "Carter: An American Dreyfus," *Illinois Law Review* 43 (Mar.-Apr. 1948):23-39.
20. Refer to the discussion on the proposed project for a steamship channel between Beaufort, South Carolina, and Savannah, Georgia, in the chapter dealing with the Intracoastal Waterway.
21. *Annual Report, 1899,* facing p. 1566.
22. Granger, *History of the Savannah District,* pp. 15, 35.
23. Ibid., p. 19.
24. *Annual Report, 1900,* pp. 2, 44.
25. *Annual Report, 1901,* p. 3; *Annual Report, 1903,* p. 5.
26. Dan C. Kingman to Chief of Engineers, 20 Mar. 1913, NA, RG 77, Entry 103, file 88863.
27. Spencer Cosby to Maj. Gen. Lansing H. Beach, Chief of Engineers, 5 Aug. 1922, NA, RG 77, Entry 103, file 131935/9.
28. Murray M. Stewart to Gen. Harry Taylor, 19 July 1922, NA, RG 77, Entry 103, file 131965/3.
29. Savannah Board of Trade to Gen. Lansing H. Beach, Chief of Engineers, 25 July 1922, NA, RG 77, Entry 103, file 131965/6.
30. Lansing H. Beach to Hon. Murray Stewart, 26 July 1922, NA, RG 77, Entry 103, file 131965/3.
31. Cullum, *Biographical Register,* 3:66, 5:128-129; Resolution, Savannah Chamber of

Commerce, 3 Feb. 1906, and A.O. Bacon to W.H. Taft, Secretary of War, 6 Feb. 1906, Installation Historical Files, Box 1545.

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33. Cullum, *Biographical Register,* 5:573-574, 6-A:7688, 7:433, 8:107.
34. Cullum, *Biographical Register,* 7:740-741, 8:187-188; *NCAB,* 37:258-259.
35. *NCAB,* 58:69.
36. Granger, *History of the Savannah District,* pp. 20-22, 31.

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1. *Annual Report, 1888,* p. 1017.
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3. *Annual Report, 1888,* p. 1017.
4. Ibid.
5. *Annual Report, 1873,* p. 734.
6. *Annual Report, 1888,* p. 1018.
7. *Annual Report, 1873,* p. 739.
8. Ibid.
9. Ibid., p. 741.
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13. Ibid.
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15. Annual Report, 1881, p. 172.
16. *Annual Report, 1888,* p. 1020.
17. *Stats. at L.,* 21:470; *Laws Relating to the Improvement of Rivers and Harbors,* 1:353; *Annual Report, 1881,* p. 180.
18. *Stats. at L.,* 24:331; *Laws Relating to the Improvement of Rivers and Harbors,* 1:464; *Annual Report, 1888,* p. 1059.
19. *Annual Report, 1888,* pp. 1057-58.
20. *Annual Report, 1890,* p. 1258.
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23. Ibid., p. 1252.
24. *Annual Report, 1896,* p. 1242.
25. *Annual Report, 1900,* p. 1923.
26. *Laws Relating to the Improvement of Rivers and Harbors,* 1:682.
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29. *Laws Relating to the Improvement of Rivers and Harbors,* 1:751-752.
30. Ibid., 2:914, 958-959; *Annual Report, 1901,* pp. 1719-26; H. Doc. 123, 56th Cong., 2d sess., pp. 5-8.
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32. H. Doc. 181, 59th Cong., 1st sess., p. 5; *Laws Relating to the Improvement of Rivers and Harbors,* 2:1126.
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**Chapter VI**

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40. *Annual Report,1905,* p. 280; *Annual Report, 1910,* pp. 393-394; *Stats. at L.,* 33:1126; *Laws Relating to the Improvement of Rivers and Harbors,* 1:1092.
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61. *Annual Report, 1905,* p. 1271; *Annual Report, 1906,* p. 278.
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70. *Annual Report, 1900,* pp. 297, 1934.
71. *Annual Report, 1903,* p. 263; *Annual Report, 1904,* p. 269; *Annual Report, 1905,* p. 277.
72. *Annual Report, 1902,* p. 256; *Stats. at L.,* 32:337; *Laws Relating to the Improvement of Rivers and Harbors,* 2:959.
73. *Annual Report, 1906,* pp. 299-300, 1197.
74. *Annual Report, 1907,* p. 313.
75. *Annual Report, 1900,* p. 1933.
76. Dan C. Kingman to Chief of Engineers, 13 Aug. 1909, NA, RG 77, Entry 103, file 8026; see also *Stats. at L.,* 36:670.
77. H. Doc. 277, 62d Cong., 2d sess., p. 3.
78. *Stats. at L.,* 36:954; *Laws Relating to the Improvement of Rivers and Harbors,* 2:1488.
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80. *Stats. at L.,* 37:226; *Laws Relating to the Improvement of Rivers and Harbors,* 2:1555.
81. H. Doc. 1354, 62d Cong., 3d sess., pp. 4-5.
82. *Annual Report, 1913,* p. 550; *Laws Relating to the Improvement of Rivers and Harbors,* 2:1586.
83. *Annual Report, 1923,* p. 626; *Annual Report, 1925,* p. 604.
84. *Annual Report, 1926,* p. 611; *Annual Report, 1928,* p. 672; *Annual Report, 1930,* p. 723.
85. *Annual Report, 1910,* p. 390; *Stats. at L.,* 36:643; *Laws Relating to the Improvement of Rivers and Harbors,* 2:1398; see also H. Doc. 561, 61st Cong., 2d sess.
86. Actually, this project was part of the Ross contract to dredge sections of the Intracoastal Waterway including Sapelo Harbor and Darien Harbor as well. *Annual Report, 1911,* p. 412.
87. *Annual Report, 1916,* p. 2277; *Annual Report, 1917,* p. 2370.
88. *Annual Report, 1923,* p. 624; *Annual Report, 1924,* p. 620; *Annual Report, 1927,* p. 649; H. Doc. 467, 69th Cong., 1st sess., pp. 2-3.
89. *Annual Report, 1911,* p. 1606.
90. *Annual Report, 1915,* p. 645.

**Chapter VII**

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2. *Annual Report, 1880,* p. 959; *Stats. at L.,* 20:372; *Laws Relating to the Improvement of Rivers and Harbors,* 1:296.
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## GLOSSARY

Apron — The area of an airport, usually paved, for parking, loading, unloading, and servicing aircraft.

Barbette — A mound of earth or a raised platform on which guns are mounted in order to fire over the parapet wall of a fort.

Barbette Carriage — A gun carriage that elevates the gun carriage sufficiently for it to be fired over the parapet.

Bastion — A work that projects outward from the main wall of a fortification. This projection can defend, by flanking fire, the face of the adjacent bastion and the wall (curtain) joining the two bastions.

Battery — A group of guns or other weapons such as mortars or artillery pieces.

Bight — A bend in a river.

Breakwater — A wall or other barrier built offshore and parallel or at an angle to a shoreline. This structure is connected to the shore for the purpose of breaking the impact of waves and thus protecting the shore or harbor from wave damage.

Bulkhead — A retaining wall built along a shoreline to hold back earth fill or to protect embankments.

Casemate — A bomb-proof chamber, usually of masonry construction, in which a cannon may be placed and fired through an embrasure or opening in the fort wall. The chamber also may be used as a magazine for storing ammunition or for quartering troops.

Demilune — An outwork, usually crescent shaped, built to defend the entrance to a fort; this usually is located inside the line of the main ditch or moat surrounding the fort.

Dike — An embankment built on dry land along a river or other body of water to prevent flooding of adjacent lands.

Embankment — A long, narrow ridge of earth or other material built at a river's edge to hold back the water.

Embrasure — An opening in a fortification wall or parapet through which a cannon can be fired.

Freshet — A sudden flooding of a stream or river, generally of limited severity and duration, resulting from heavy rains or melting snow.

Groin — A structure made of wood, steel, concrete, or stone built out into the ocean and perpendicular to the shore for the purpose of protecting the shore from erosion or for trapping sand carried by littoral currents.

Hardstand — An area, usually paved, where aircraft are parked.

Hopper dredge — One of two main types of underwater excavating vessels: it uses two drags on either side of the vessel to churn up the bottom of the river or harbor. The water and earth are sucked up and deposited into bins or hoppers on board. When the dredged materials have filled the hoppers, the vessel proceeds to a dumping place.

Jetty — A structure, usually made of rocks, built out into the water at the mouth of a river or harbor entrance. It is placed parallel to the navigation channel and may be used singly or in pairs, one on each side of the channel. A jetty is used to control littoral currents, thus reducing deposits of sediment and increasing the flow of water through the channel.

Lighter — A boat or barge used to carry cargo from a smaller vessel to a ship unable to dock at a wharf; to carry cargo in such vessels.

Mattress — A mat of woven brush, poles, or sawed lumber used as a foundation in soft ground or sand for jetties, revetments, and spur dikes.

Pile dike — A permeable fence-like structure made of timber piles driven into the bottom of a river in a line parallel to the riverbank and lashed or fastened together for the purpose of shifting or contracting the river current to increase water velocity and help scour the river channel.

Pipeline dredge — One of two main types of underwater excavating vessels. It uses a suction pipe with a cutterhead at the bottom that churns up the bottom of a river or harbor. The suction pipe sucks up water and earth and pumps them via a pipeline to a deposit or spoil area, usually on shore, where the water runs off and leaves the solid materials behind. Also known as a cutterhead dredge and pumpboat.

Pumpboat — See *pipeline dredge.*

Rampart — The main wall of a fortification; a broad embankment on which the parapet is built. It is usually just inside the ditch or moat and is wide enough at the top to permit the movement of men and guns behind the parapet.

Revetment — The facing of rock or cement on an embankment to help prevent erosion by the river's current. Also called a retaining wall.

Riprap — Stones or rocks of odd sizes and shapes used to face embankments and otherwise protect a riverbank from erosion; to place such rocks.

Salient — A wall, usually of a bastion, projecting outward beyond the general line of fortification walls (curtains) and away from the center of the fortification. An outwardly projecting part of a trench system or line of fortification.

Scour — To clean or clear a channel by using the force of the river's channel or action of waves; the ability to do this.

Seawall — A large concrete, stone, or metal wall of embankment built along the water's edge to protect the shoreline from the action of waves.

Shoal — A shallow place in a river or other body of wate due to a sandbar or outcropping of rock; to create a shallow place through the buildup of sand.

Slough — An area of marshland or deep mud connecting tidal creeks.

Sluice — A channel for excess water.

Spur dam — See *spur dike.*

Spur dike — Similar to a groin but used in a river to protect the shore against erosion and to direct the river's current for scouring.

Spur jetty — See *spur dike.*

Terreplein — The top, flat surface of a fortification wall directly behind the parapet; the flat surface behind the parapet where cannon are placed.

Training dike — A river contraction device made of parallel rows of piles, between which are placed brush and rocks, extending out from the riverbanks at an angle and then downstream parallel to the opposite shore.

Training wall — A structure built in a river or estuary parallel to the shoreline to direct and confine the flow of the current.

Wing dam — See *spur dike.*

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